Vol. 121, No. 16

PAPER TRADE JOURNAL

Title Reg. U. S. Pat. Off.

October 18, 1945

Kimberly-Clark Plans $5,000,000 Expansion

Enlargement of Facilities At Niagara, Wis., To Substantially Add To Concern's Book Paper Output — Consolidated Opens Central Office—Recounts Details of Cellulose Products—Other Late News.

APPLETON, Wis., October 15, 1945—Kimberly-Clark Corporation, Neenah, Wis., next week will start a paper expansion and modernization program at its Quinnesec mill at Niagara, Wis., at an expenditure upward of $5,000,000, according to an announcement today by Cola G. Parker, president.

The project will be the first step in a substantial increase in the corporation's book-paper production. It will be the largest expansion in this field by the corporation since 1920. Kimberly-Clark has pioneered in paper and cellulose products and has been a leader in introducing new methods for coating paper to improve printing.

A new building will be erected adjoining the present mill. It will ultimately stretch approximately 600 feet and be wide enough to accomodate two high-speed fourdrinier machines for the manufacture of machine-coated book-paper, and generally supply straight-line production. One of these machines will be installed immediately, and the project is expected to be completed in 1947.

In addition, a complete mill modernization program will be carried out. This will include new material handling facilities; modernization of existing machinery; installation of personnel facilities, such as locker-rooms and modern eating facilities, and temperature and humidity controls. The intention is to convert Quinnesec into a completely integrated mill, able to consume all of its own pulp.

Corporation officials have emphasized that the aim is to streamline facilities and equipment with the view of providing greater job security, and to make permanent employment in the future exceed that of any previous peak.

"Overall, the program will strive for maximum quality and efficiency of personnel, product and mill," Mr. Parker said. "As our financial ability permits, we expect to add further streamlined equipment in our mills, and, in this way, provide maximum earning opportunities for our people, plus the assurances mentioned above. A thorough survey of all our facilities led us to the conclusion that Niagara, Wis., was the logical place to begin."

The Quinnesec mill is located on the banks of the Menominee river, about 8 miles from Iron Mountain, Mich. Kimberly-Clark has five mills in Wisconsin.

Consolidated Opens Central Office

Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., has announced the opening of a central operations office at Rhinelander, Wis. The company owns 85,000 acres of forest land in Oneida and Forest counties, all within 40 miles of Rhinelander.

The new office will facilitate the handling of the company's timber and forestry operations in Wisconsin and northern Michigan. Cost accounting, payrolls, general purchasing of supplies and tools for camps, safety and workmen's compensation, cruising, mapping of lands, forestry plans and records, and general work in connection with logging and forestry operations will now be handled from that office. The company's timber operations in the two states are located within a radius of 125 miles of Rhinelander.

Operations at Ashland, Wis., look after the loading and shipping of pulpwood which is rafted there from Minnesota and Canada during the summer. Pulpwood logging is carried on during the winter in Ashland county.

The company plans to expand and intensify its forestry operations. Its nursery in Forest county will furnish white spruce trees for planting. Roads are being built through these lands to help in forestry and logging operations. All lands will be mapped and forest management plans developed.

Consolidated will have a staff of eight at the new office. John Schueler is in charge of general purchasing, employment, safety and workmen's compensation, taxation and insurance. There are two foresters, E. S. Hurd and John W. Macon.

Reveal Details of New Cellulose Products

Details concerning new plastics, papers, adhesives and extracting alcohol from wood and other wartime developments were revealed last week to a group of 35 newspaper men from the middle west and other parts of the country, when they visited the United States Forest Products Laboratory at Madison, Wis.

One of the most unusual of the many containers developed was a cardboard and wood box called a "free fall container." It has flaps and wings that open when dropped from an airplane. It spirals through the air as it is dropped and lands lightly without a parachute. Contents sometimes were dented but seldom damaged extensively.

When wood itself became a wartime shortage, the laboratory again stepped into the picture with its research on the use of hardwoods for pulp purposes. A semi-chemical process developed at the laboratory was used, and Life Magazine cooperated by running a part of one issue on the paper from the new pulp.

(Continued on page 28)

Britain To Sharply Cut Newsprint Imports

Canadian Representatives Succeed In Modifying Decision To Entirely Suspend Newsprint Purchases In 1946 To Provide 50,000 Tons — Flow of Supply Is Important — Other Late Mill News.

MONTREAL, Que., October 15, 1945—Not only newsprint manufacturers but the Canadian public in general were startled last week by an object lesson in the real meaning of the oft-repeated information that Britain was so short of dollar exchange that she would have to curtail her imports from this side of the Atlantic to a minimum. This eye-opener to the realities of post-war conditions in international trade came by way of official confirmation of the rumor that the United Kingdom had decided to suspend entirely the importation of 224,000 long tons of newsprint which had already been contracted for with Canadian and Newfoundland suppliers, to be delivered in 1946. This suspension was modified when it became known later that representatives both of the industry and of the Canadian Government had been active in London endeavoring to induce the British Government to alter its drastic decision, and that they had succeeded in effecting an agreement by which the British Government would scale down her Scandinavian imports of pulp during 1946 to allow purchase of 50,000 long tons of Canadian and Newfoundland newsprint. The remainder of the original orders which exceeded this 50,000 ton limit would be deferred for possible shipment in 1947 and 1948, exact arrangements for those years being left a subject for further discussion early next year.

Sir Walter Layton, chairman of the Rationing Committee of the British Newspapers Association, in commenting on the situation prior to the revised agreement with the Briitish Government, said the official Newsprint Supply Company had been making arrangements to comply with plans of the publishers to enlarge the present four-page daily newspapers. The Government, however, had notified the company that, owing to the need to conserve dollar expenditure, these enlargement plans would have to be postponed, and this ruling would keep the papers down to their present wartime size in 1946.

During the negotiations it was pointed out that the immediate effect of the cancellations of contracts would not embarrass the Canadian mills financially, since the newsprint affected could easily be sold in the United States, and on this phase of the matter Sir Walter Layton said: "It is vital to the British press that Canada should not sell our newsprint to the United States pending later developments." He did not amplify this statement, but apparently it carried weight.

Wartime Newsprint Allocation to End

Official announcement has been made that wartime allocation of Canadian newsprint production by the Newsprint Administrator of the Wartime Prices and Trade Board to all markets other than to Canada will be discontinued as of December 31, 1945, and that the industry compensation plan, which has been functioning since September 1, 1942, under which wartime burdens were equalized amongst the companies, will be terminated on that date.

This announcement followed a meeting on October 10, in Montreal, between the chairman of the Prices Board and the Newsprint Administrator on the one hand and the newsprint industry's Advisory Committee on the other hand.

Commenting on the decision to retain mill allocation of newsprint for Canadian consumption, the Newsprint Administrator said that it would assure to Canadian publishers the tonnage currently available to them.

The industry compensation plan was an intricate piece of machinery evolved by the industry, so as to permit the transfer of orders received by one mill to another if, through restriction in power or other commodity by government controllers, it was unable to fill the contract to its customers. Through the plan other mills would make the paper and ship it to the first mill's customers, for which it would be paid a certain percentage of profit under the Canadian Commodities Stabilization Fund, while the mill which had the original contract would also receive compensation.

A spokesman for the Prices Board said that at the meeting prospects for newsprint production and distribution for the coming year were thoroughly discussed. Production of newsprint now, he added, is chiefly limited by lack of pulpwood, and the chief concern regarding next year's production is the amount of labor available to cut wood this winter.

Sharp Rise in Pulpwood Value

Final figures regarding the value of pulpwood produced in Canada in 1944—the wood now constituting the raw material for the current production of pulp and newsprint—have been disclosed by returns tabled in the House of Commons. They show that the value more than doubled that of 1939, although in cords the increase was not nearly so great.

In 1939 Canada produced 6,899,986 cords of pulpwood worth $58,302,688. In 1944 she produced 8,668,566 cords worth $124,363,926, the highest total of the war years.

Exports in 1939 and 1944 were almost identical, totalling roughly 1,392,000 cords, a drop from the peak of 1,808,000 cords in 1942.

B. R. Cancell Goes to Powell River Co.

WASHINGTON, D. C., Oct. 15, 1945—Benton R. Cancell has resigned as Director of the Forest Products Bureau, WPB, and taken a position as vice-president in charge of operations of the Powell River Company, Vancouver, B. C. His duties in Washington will be taken over by George Johnson, who was assistant secretary of the Writing Paper Manufacturers Association before enlisting in the Navy two years ago.

Dexter to Install New Fourdrinier

DEXTER, N. Y., October 15, 1945—The Bagley and Sewall Company, manufacturers of paper mill equipment will soon deliver to the Dexter Sulphite Pulp and Paper Company a new fourdrinier which will be installed on their machine at the Dexter mill. This new equipment is of the very latest design.

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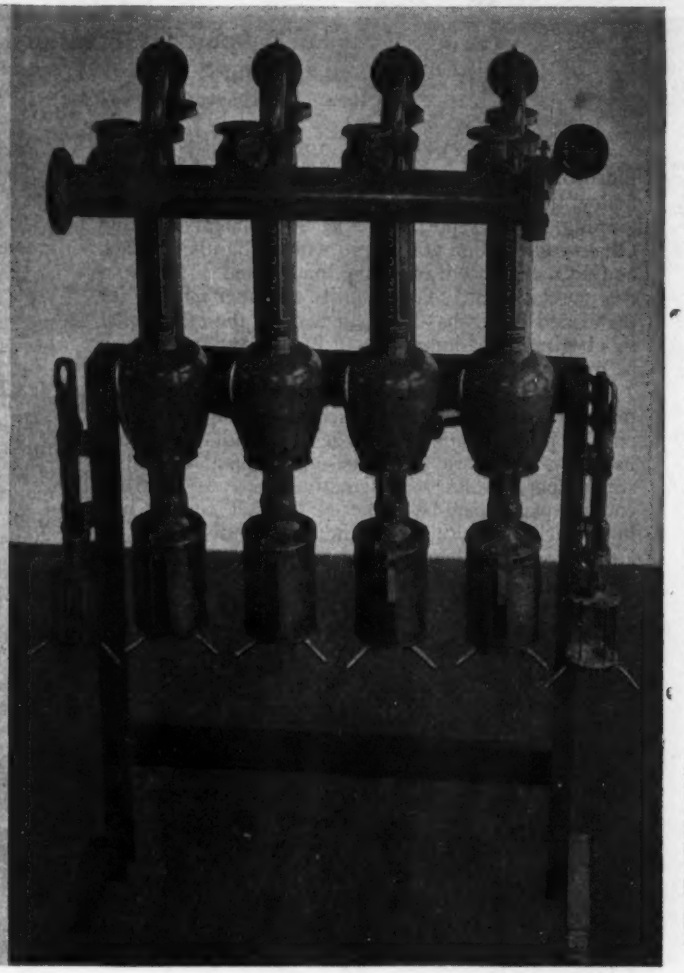

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Government Cutback Encourages Midwest

Printers' Strike Temporarily Point of Interest But Large Backlogs of Orders and Pricing Situation Are Cause of Concern—To Discuss Paper Before Professional Group — Other Late Market News.

CHICAGO, Ill., October 15, 1945—Perhaps one of the directly encouraging signs of a return to "normalcy" in the industry, even though it is only a beginning, is the report that the Government Printing Office organization at Chicago will be slightly cut back as GPO starts to draw in the lines it had opened into commercial areas. The quantity of paper needed for the armed forces has been cut back to the extent that this beginning of improvement in civilian supplies can be made.

However, the local trade is more interested in the printers. strike situation which is having its effect on the jobber trade and on a wide range of paper users. And there is likewise little real optimism among paper sales representatives here as to when enough paper can be cornered to start cutting into huge backlogs. Rather is there more discussion of an improvement in operating methods within the industry and of how the trade can hold the esteem of the public as to the importance of paper. These two thoughts were given marked impetus at the Chicago meetings of the National Paper Trade Association held here last week.

The pricing situation continues to give some concern here and this concern is expected to increase unless there is sufficient paper on hand to insure enough volume to carry reduced margins.

Waste paper collections remained little changed with the need for organized salvage efforts continuing to grow more and more apparent, according to reports.

Forsythe Now With Messenger

A. N. Forsythe, for twelve years prominently identified with Fraser Industries, Inc., with headquarters in Chicago, has recently resigned from that firm to take a position with the Messinger Paper Company, well known Chicago paper jobbers. It is reported that Mr. Forsythe will specialize in the mill department division of Messinger activities, utilizing not only past experience but more recent knowledge gained while aiding the War Production Board in administrating some of its production orders.

To Discuss Paper Surfaces

V. Vallandigham, representative of the technical department of the Kelco Company, Chicago, is to be the speaker at the next meeting of the Chicago Profehssional Paper Group to be held at the Chicago Bar Association dining rooms on Monday evening, October 15. Mr. Vallandigham will discuss "The Effective Evaluation of Paper Surfaces for Printability."

Mr. Vallandigham is, in reality, a "home product" for he is the secretary of the Group and has been very active in its development. He is well known for his research work on paper printability statistics and equipment development and is expected to describe and demonstrate the photo-electric absorption meter which he has developed to meet this need. The discussion is expected to have a wide appeal not only to those in the graphic arts division of the industry but to anyone concerned with the application of a film-forming material to a paper service. As a result, an excellent audience is expected. Surface conditions of paper or paper board being of vital importance to the quality known as printability, the value of a test which will measure this surface property is certain to create genuine interest.

It will be the second meeting of the Fall season for the Group, which now has more than two hundred members interested in the scientific and technical growth of the industry.

Richey to Service Illinois Organizations

Illinois, increasingly popular as the headquarters for some excellent fine and coarse paper jobbing firms, is to get a new boost in the near future with the formation of the Illinois State Paper Association with John L. Richey, executive secretary of the Middle States Wrapping Paper Association and Paper and Twine Association, as its new Secretary. Mr. Richey will assume his added duties at once and plans to make frequent trips to keep in touch with the Illinois paper trade. He will also serve as the secretary and counselor for the Chicago Paper Association, his assumption of the dual duties insuring splendid cooperation and unification of purpose between Chicago and downstate member firms. The appointment of Mr. Richey to serve these two Associations, the one long established and the other a new organization, was announced early this month after meetings of the Chicago Paper Association. Mr. Richey's headquarters are now in Cincinnati.

Speaks to North Side Printers

M. E. McGarry, sales manager for the Eastern Corporation with offices at 111 W. Washington street, spoke before the North Side Printers Guild on Tuesday evening, October 9. His subject was the "Future Outlook of Fine Papers." As western district sales manager for Eastern, Mr. McGarry outlined to the printing trade members present just what they could expect in the way of an adequate supply of fine papers in the near future, outlined the obstructions in the way of an early return to "normalcy" and stressed the possibilities of improved quality and performance which were virtually certain to be an outgrowth of the experience gained by the industry during the war years.

Bill Tilden Returns to Mead

W. T. "Bill" Tilden, after a long period of service in the Navy, much of it in foreign countries, has now returned to civilian life and is reported to have already assumed his duties as a sales executive with the Mead Sales Company.

Wallpaper Sales Up

Net sales of $16,327,390, highest in the History of United Wallpaper, Inc., of Chicago and Joliet, were reported for the year ended June 30. The total compares with $14,196,748 during the preceding year. Net profits, after all charges including taxes, were $533,857, compared with $526,907 for the fiscal year ended June 30, 1944.

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Nopco Wax Sizes help improve finish and feel, increase scuff resistance, and help make coating more effective and economical. If you are a large user of wax emulsions for waterproofing paper and paperboard products, you will find it economical to make your own wax size with Nopco 2251-B Wax Emulsifier. Emulsions prepared with it are *stable* at any concentration, from an infinite dilution up to 70% solids.

If you prefer a ready-made paraffin wax emulsion—Nopco 2252 is the product to use. It effects worthwhile savings in alum and casein costs where the sheet is subsequently coated—contains 50% effective waterproofing solids—is stable in any dilution or under any type of mechanical agitation. We will gladly send you technical data on use of Nopco 2251-B Wax Emulsifier or Nopco 2252 Wax Size.

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Box Makers Meet at Harrisburg

HARRISBURG, Pa., October 15, 1945—More than a hundred manufacturers attended the meeting of the Central Division, National Paper Box Manufacturers Association, on Wednesday last at Penn-Harris hotel. William J. McClintock, Jr., of the McClintock Corporation, president of the Division, presided.

Al Bond, president of the National Association, discussed his plans for the association. Clement Moore, Philadelphia, cost analyst for the N.P.B.M.A., told those present where their markets will be found in the post-war era; the dangers just ahead for those who maintain obsolete cost systems, or none at all. Frank G. Canning, Chief, Paper Box Section OPA, Washington, brought pricing regulations up to date; Ralph L. Harden, Attleboro Falls, Mass., chairman of Public Relations Committee of the N.P.B.M.A., presented some concrete data on the far reaching advertising program the association is planning; Walter P. Miller, Jr., Philadelphia, and a former president of the association, talked on the problems which the industry is about to face; Barney Novasel, New York, analyzed the paper situation today and tomorrow.

Arnold B. Huyssoon, Ridgefield Park, N. J., made a forecast of when the waste paper and paper board situation will improve; Carl A. Claus, Hoboken, N. J., and Otto Schultz, Hyde Park, Mass., revealed some pertinent facts concerning the delay in receiving paper box machinery as quickly as was expected; Chester A. Gage, New York, told not only when the industry may expect to receive pre-war adhesives, but also the part that synthetic resins will play in paper box adhesives in the post-war era.

Kieffer Properties Under Renovation

BROWNSTONE, Ind., Oct. 15, 1945—John E. Kieffer, treasurer and general manager of the Kieffer Paper Mills and general manager of the Shoksorb Paper Products Company, reports that both companies have been busy this summer putting their plants in condition for increased production and more economical operations.

Two truckmobiles have been acquired to make possible more efficient loading of paper and unloading of raw material. The companies also recently completed laying a large pipe line three quarters of a mile in length to White River, and now have an ample water supply. Now they are working an automotive coal unloading equipment for their power plant. They are also rebuilding all five ventilators over their paper machines, making them out of steel. Total cost of these improvements is not available.

Jahn on Foreign Service Appointment

Dr. Edwin C. Jahn, professor in the Pulp and Paper Department of the New York State College of Forestry at Syracuse University, has been granted sabbatical leave to accept an appointment with the Auxiliary Foreign Service of the Federal Department of State. He will undertake a special study of commercial and economic developments in the pulp and paper industry of the northern European countries.

This project was initiated by the Pulp and Paper Unit of the Bureau of Foreign and Domestic Commerce of the Department of Commerce, with the cooperation of the Department of State. It is the responsibility of the Department of Commerce to keep United States industry and business currently informed on international trade conditions.

Warrensburg Contracts for Pulp

WARRENSBURG, N. Y., October 6, 1945—The Warrensburg Paper & Pulp Company, operated by Isadore Baum and Son, has signed a contract with a Quebec firm for supplying the plant here with all the pulp wood needed after the mill has completed its reconversion. The Canadian firm is reported to be among the largest in the Dominion and representatives sent here were favorably impressed with the local mill as well as the improvements which have already started.

Construction work calls for the erection of a new addition to house another paper machine which will allow a substantial increase in production. It was also announced that three new grinders have already been installed. The erection of the new building will commence as soon as the present government contracts expire and upon its completion it is planned to start production of soft paper such as towels, toilet paper, napkins, etc. Contracts for these products are reported on hand which will permit capacity production in all departments.

During the past week a number of discharged soldiers returned to their old positions here and many more are expected to apply as soon as they are released.

Tells of Imperial Paper Activities

GLENS FALLS, N. Y., October 1, 1945—Orsen C. Beaman, chemist of the Imperial Paper and Color Works, delivered an address before members of a civic organization stating that the firm helped produce napen used in making fire bombs effective in the recent war. He also said that magnesium powder for bullets and bombs was another major product of the local plant. Chemicals used in gas masks and for olive drab paint were also produced and the firm nearly went into the production of bombs, he said. He pointed out that the corporation has a large research staff with several separate research and development laboratories and expressed optimism regarding the future of the pigment and wall paper business.

Dike Break Halts McIntyre Mill

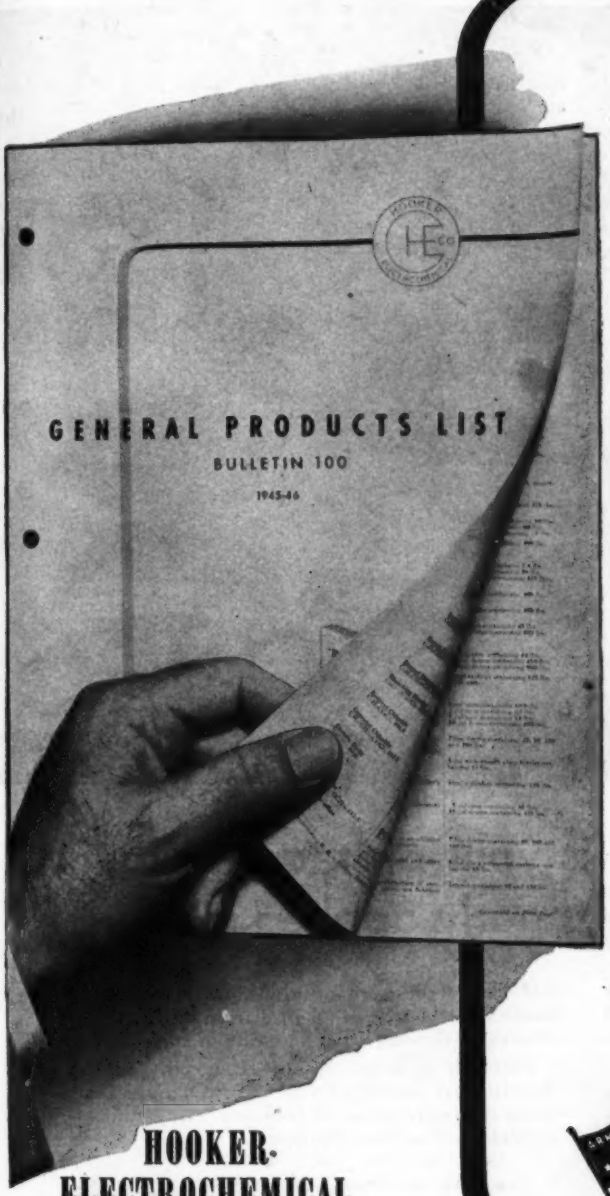
FAYETTEVILLE, N. Y., October 13, 1945—A 75-foot gap in the wall of Ledyard dike, eroded by swollen waters of Limestone creek about a quarter-mile north of Manlius, has forced McIntyre Brothers, Incorporated Fayetteville paper mill to shut down at a cost of $1,000 a day. E. F. McIntyre, vice-president said yesterday that it will take three to four weeks to build a wood and concrete sluiceway and that the mill would remain closed until its completion.

The paper mill depends on the artificial stream for more than a million gallons of water a day, used in the production of industrial tissue papers, and for about 50 per cent of its power.

Covel-Hanchett Changes Ownership

BIG RAPIDS, Mich., October 16, 1945—The Hanchett Manufacturing Company announces the purchase of the Covel-Hanchett Company, the sale being effective September 1, 1945. A new division of the Hanchett Manufacturing Company is to be formed known as the Saw and Knife Fitting Machine Division. The new Hanchett division will continue under the same management as its predecessor, the Covel-Hanchett Company.

Seven New Chemicals Have Been Added to Hooker's General Products List



What is the boiling range of Hooker Monochlorbenzene? What is the chlorine content of Hooker Sulfur Dichloride? Is Lauryl Chloride a liquid or solid and what are some of its uses? In what size containers is Hooker Cyclohexanol shipped?

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A copy of this new bulletin which gives descriptions, principal specifications, uses and shipping information will save you time and trouble in selecting chemicals for your requirements.

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It is the Fawick Airflex Clutch—proved for superior performance and economy—in hundreds of industrial applications and in thousands of Diesel-driven Navy ships.

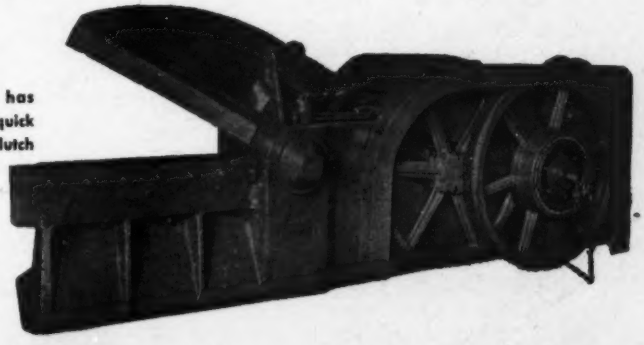
Let us help you engineer clutch trouble *out* of your machines. Book on request.

Oil-well drilling rig—equipped with 11 Fawick Clutches.

Steel rolling mill Fawick-equipped for smooth, even power.

▲ Modern power shovel gives full-time operation through dependable Fawick Clutches.

◀ Heavy duty press has smooth starts and quick stops with Fawick Clutch and Brake.



▶ Alligator shear operates through Fawick Clutch and Brake.

FAWICK *Airflex* CLUTCH

Government Sees Strong Paper Demand

WASHINGTON, D. C., October 10, 1945—The demand for most grades of paper and paperboard will continue strong through the transition period with increasing supplies of paper towels, facial tissues and shopping bags being made available to consumers but the shortage of newsprint will continue, according to the September Industry Report on Pulp and Paper issued today by the Bureau of Foreign and Domestic Commerce, Department of Commerce.

While it is possible to look reasonably far ahead and anticipate some of the over-all conditions and developments, the outlook for the next six months is difficult to analyze, the report says, but it is expected that wood pulp supplies will "continue tight with a gradual easing as inventories are reestablished and imports from overseas gain greater momentum."

"It likely will be a year or more from now, when overseas wood pulp imports are resumed in larger volume, before a peacetime competitive pulp market in the United States is again fully apparent," the report said. "Even in the second year after VE-Day world wood pulp demands may approximate available supplies."

The report said that the domestic pulpwood cut must be increased to attain the 1945 domestic goal of 16,000,000 cords if the reconversion needs are met but noted a moderately improved wood pulp inventory position because of reduced military requirements and sizable imports from Sweden.

But even if pulpwood production in the United States and Canada is increased in the near future this will not immediately ease the shortage because the wood cut now will not become available for paper production until the spring of 1946, the report said.

Taking a long-range view of the industry, the report noted that "already a number of companies have announced their postwar objectives and many more are expected to take similar aggressive action," and that "progressive leadership of this character will exert a tremendous influence in terms of production and purchasing power toward the common American goal of greater employment and more goods for more people."

Estimates made by the Department of Commerce in June indicated that the paper and allied industries, plus the printing and publishing group, anticipated capital outlays in the next year of about $530,000,000 compared with $136,000,000 in 1939, the report said.

Jarisch Triples Employment

NORTH ADAMS, Mass., September 22—Since taking over the E. H. McMillin Company last May, the Jarisch Company, has tripled its employment and has, Henry Jarisch, Jr., said today, received orders which will keep the Chestnut-street plant busy "until well in 1946." New machinery originally purchased for shipment to another Jarisch firm, the United Folding Box Company, Inc., of Holyoke, is being diverted to North Adams and some equipment has been shifted from the Holyoke branch to this city.

Boston Trade Plans a Good Time

BOSTON, Mass., October 15, 1945—Mental Telepathy, Mirth and Mysticism will be features of an exceptional entertainment at the fall meeting of the Boston Paper Trade Association to be held in the ball room of the Parker House, November 14.

Issues New Tissue Price Determination

WASHINGTON, D. C., October 10, 1945—Manufacturers of toilet tissue and paper towels have been given a simplified method of determining price ceilings for any new grades they may bring out, the Office of Price Administration announced today in a revision of MPR 266.

This action, effective October 10, 1945, has been taken to facilitate pricing by the industry following the lifting of production restrictions on the grades of both these products.

On all new grades, manufacturers will establish their own ceilings by adding their margin on the most comparable grade to the sum of total costs, freight and cash discounts of the new grade.

The ceiling price so determined must be reported to OPA's national office and be confirmed by the agency. So that business will not be held up pending confirmation, sales may be made at the new price ceiling, but in the event OPA reduces the ceiling the manufacturer must refund the difference to any customers charged the higher price.

This method replaces a formula method previously in effect that was not up to the standards of simplicity that OPA is striving to attain generally so that ceiling pricing will not prove an impediment to production during the reconversion period.

Another change today permits manufacturers selling paper towel cabinets and toilet tissue dispensers to add the same margin they had on these items in March 1942. Those who gave these items away, or rented them, in March 1942, are required to continue the same practice.

Smith Paper Names Promotions

LEE, Mass., October 6—Walter F. Tatum, vice president and general manager of the Smith Paper, Inc., today announced several changes in personnel at the local mills operated by the corporation.

Harry M. Keating heads the list, having been appointed manager of the laboratory facilities. His duties will deal with research as well as the practical, technical and inspection facilities of the laboratory.

Keating, formerly assistant production manager of the technical division has been with the firm 20 years.

J. Joseph Powers, who has been superintendent of the Eagle Mill, has been appointed assistant production manager to replace Keating. He joined Smith Paper in 1906.

William F. Powers, has been appointed superintendent of Eagle Mill to succeed his brother. Powers joined Smith Paper in 1914.

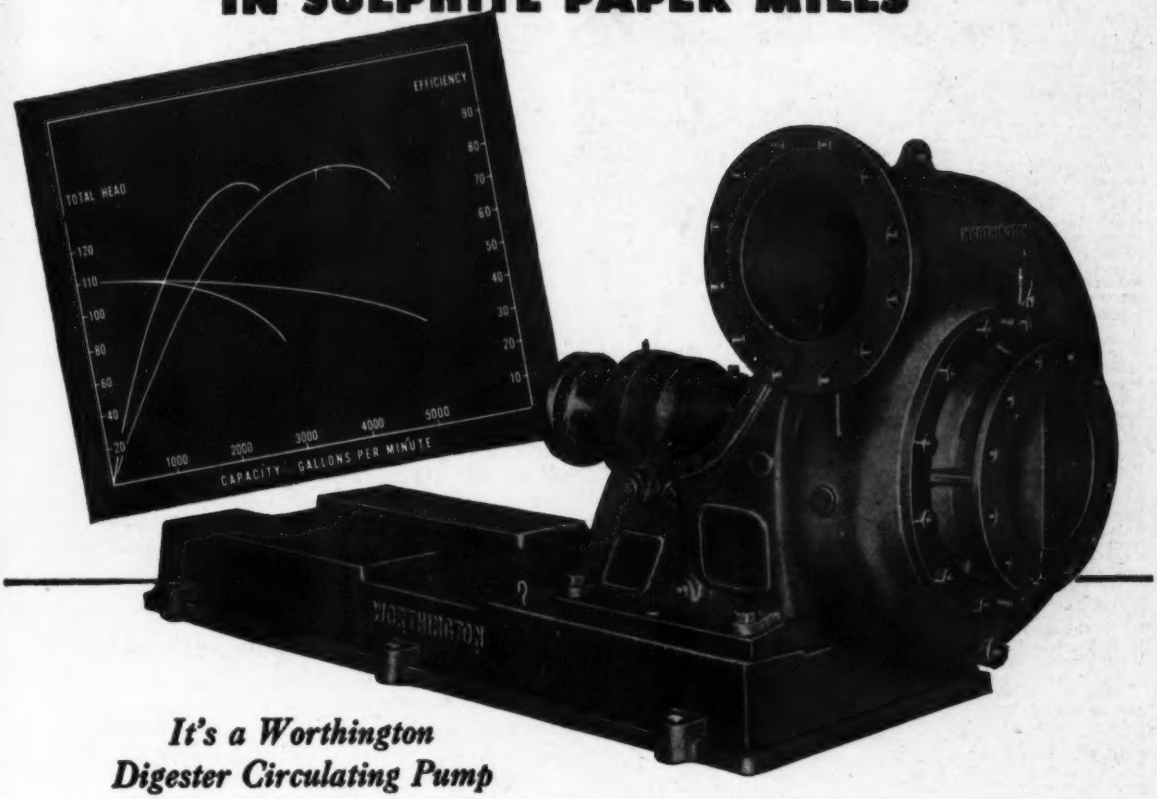
Louis A. Henry has been transferred from night superintendent of Columbia mill to night superintendent of Eagle mill. He has served with Smith Paper since 1925.

James Talmadge of Saugerties, N. Y., formerly connected with the Diamond Paper Company in that town, has been appointed night superintendent of Columbia mill.

Lundgren Returns to Paper Trade

BOSTON, Mass., October 8, 1945—Henry A. Lundgren, previously a Major in the Ninth Army Air Force, has joined the sales department of Baird & Bartlett Company, paper board dealers. Mr. Lundgren was with Bicknell & Fuller Paper Box Company for 18 years and was treasurer at the time he left to go into the service.

HANDLING SULFUROUS ACID EFFICIENTLY IN SULPHITE PAPER MILLS



It's a Worthington Digester Circulating Pump

Corrosion-resistance is one yard stick for measuring the value of a pump for handling sulfurous acid. But *performance* is equally important.

You get *both* . . . maximum corrosion-resistance and peak performance . . . when you choose a Worthington Digester Circulating Pump. That's because Worthington engineers have the *unique* ability to design and manufacture stainless alloy pumps with the *hydraulic design* characteristic of pumps made of more easily-worked metals. The sample performance curve shown above tells its own story.

With more actual pumping experience . . . with the greatest research and manufacturing facilities in the field of hydraulics — it is natural that Worthington should lead in pump developments for paper manufacturing processes.

Whatever your process — Sulphite, Kraft or Soda — whatever your pumping problem, Worthington Pump Application Engineers have the knowledge and the line of pumps to put your process on a profitable basis.

For proof that *there's more worth in Worthington* . . . for a date with a Worthington P.A.E.* . . . write today. *Worthington Pump and Machinery Corporation, Harrison, New Jersey.*

*Pump Application Engineer.

WORTHINGTON

24CS-1

THE WORLD'S LARGEST MANUFACTURER OF PUMPS

CENTRIFUGAL STOCK PUMPS Type FP. Handle all kinds of stock up to 6½% consistency. 4 sizes. Capacities up to 3200 GPM; heads up to 160 ft.; speeds up to 1750 RPM.

GENERAL PURPOSE PUMPS Type C.F. Open impeller. Single stage. Sizes 1" to 4". Capacities up to 1000 GPM heads up to 130 ft.; speeds up to 2475 RPM.

BOILER FEED PUMPS Type UB-2. 7 sizes. Capacities up to 1500 GPM; heads up to 1000 ft.; speeds up to 3600 RPM.

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending October 13, 1945

STOCKS

	High	Low	Last
A. P. W.	7¼	6⅝	6⅝
Armstrong Cork Co.	55¼	54	54¾
Celotex Corp.	20½	20	20⅛
Celotex Corp., pf.	21⅜	20⅞	21¼
Certain-Teed Products Corp.	15⅛	14⅝	14⅞
Certain-Teed Products Corp., pf.	...	...	...
Champion Paper & Fibre Co.	44¾	44	44
Champion Paper & Fibre Co., pf.	109½	109½	109½
Congoleum Nairn Co.	38¼	37	37⅜
Container Corp. of America	35½	33⅜	35½
Continental-Diamond Fibre Co.	15	14	14⅝
Crown-Zellerbach Co.	28¾	27⅝	28¼
Crown-Zellerbach Co., pf.	107	104½	104½
Dixie Cup Co.	38	34	38
Dixie Cup Co.,—A	47⅞	47⅞	47⅞
Flintkote Co.	33¼	32¼	33¼
Flintkote Co., pf.	109½	109	109
Robert Gair	7¾	7½	7½
Robert Gair, pf.	19⅝	19	19⅝
International Paper Co.	34¼	32⅝	34⅛
International Paper Co., pf.	105¼	104	105
Johns-Manville Corp.	140¾	137½	137½
Johns-Manville Corp., pf.	...	...	...
Kimberly-Clark Corp.	54¾	53½	54¾
Mac Andrews & Forbes	34¾	34¾	34¾
Mac Andrews & Forbes, pf.	...	...	...
Masonite Corp.	52¾	49	52¾
Mead Corp.	20	19	20
Mead Corp., pf. A—6%	108	108	108
Mead Corp., pf. B—5½%	108¾	106	107
National Container Corp.	23	20½	22¾
Paraffine Companies, Inc.	72¾	72¼	72¾
Paraffine Companies, Inc., pf.	...	...	...
Rayonier, Inc.	24⅞	23¾	24⅛
Rayonier, Inc., pf.	38½	37½	38⅜
Ruberoid Co.	45¼	44	45¼
Scott Paper Co.	58	57½	58
Scott Paper Co., pf.	...	...	...
Sutherland Paper Co.	40	40	40
Union Bag & Paper Corp.	22½	21⅝	22½
United Paperboard Co.	8	7⅞	8
U. S. Gypsum Co.	105	103¾	105
U. S. Gypsum Co., pf.	...	...	...
West Virginia Pulp & Paper Co.	35	34¼	35
West Virginia Pulp & Paper Co., pf.	...	...	...

BONDS

Abitibi Pulp & Paper Co. 5s '53	107¾	107	107½
Celotex Corp. 3¾s '55	...	...	...
Certain-Teed Products Corp. 5½s '48	...	...	...
Champion Paper & Fibre Co. 3s '65	102¾	102¾	102¾
International Paper Co. 6s '55	109	108¾	108¼
International Paper Co. 5s '47	103¾	103¾	103¼
Mead Corp. 3½s '53	...	...	...

New York Curb Exchange

High, Low and Last for Week Ending October 13, 1945

STOCKS

	High	Low	Last
Great Northern Paper Co.	44½	41⅝	41⅝
Hummel-Ross Fibre Corp.	10⅝	10⅜	10¼
St. Regis Paper Co.	9⅛	8⅜	9
St. Regis Paper Co., pf.	...	...	...
Taggart Corp.	9⅛	8	9⅛

BONDS

American Writing Paper Co. 6s '61	...	...	...

Hinde & Dauch Calls 5,000 Preferred

Hinde & Dauch Paper Company has called for redemption of 5,000 shares of $4 cumulative convertible preferred stock at $105 a share and accrued dividends of 50 cents a share as of November 15. The stock is convertible into common at the rate of 3⅓ shares of common for each preferred share. The common is listed on the New York Stock Exchange and closed yesterday at 33⅛.

Container Elects Keller

Mr. John J. Brossard, Vice President and Director of Container Corporation of America, has advised the company of his desire to retire from active service effective October 1. The vacancy on the board of directors created by his resignation has been filled by the election of Mr. Ira C. Keller, who has served the company for nineteen years and is vice president in charge of the company's eastern division.

Shareholders Approve Abitibi Plan

TORONTO, Ont., October 15, 1945—Meetings of the various classes of shareholders and unsecured creditors of Abitibi Power and Paper Company, were completed here this week with the greatest unanimity for approval of the reorganization plan to lift the great company out of receivership, in accordance with recommendations made some time ago by what has been known as the Hughes Committee.

The plan was approved by common shareholders, 6% cumulative preferred shareholders, 7% cumulative preferred shareholders and the unsecured creditors at meetings held here on Oct. 4, 5, 8 and 10, respectively. Holders of 505,418 of the outstanding 1,088,117 common shares were represented at the meeting for that group and voted unanimously for the plan. At the meetings of the preferred shareholders 223,501 of the outstanding 348,818 6% preferred shares and 3,996 of the outstanding 10,000 7% preferred shares, were voted in support of the plan without a dissenting vote being cast. Unsecured creditors were asked to approve a plan whereby they would receive 100 cents on the dollar, exclusive of interest, on their claims, but with an overall limit of $900,000.

With respect to the 7% shareholders, the plan provides that all cumulative dividends are to be cancelled and each $100 par value share divided into five preferred shares of par value $20. A preferred dividend of $2.50 per share is to be cumulative from January 1, 1945. The shares are to be redeemable at $37.50 each.

Time, Inc., Buys Maine Seaboard Mill

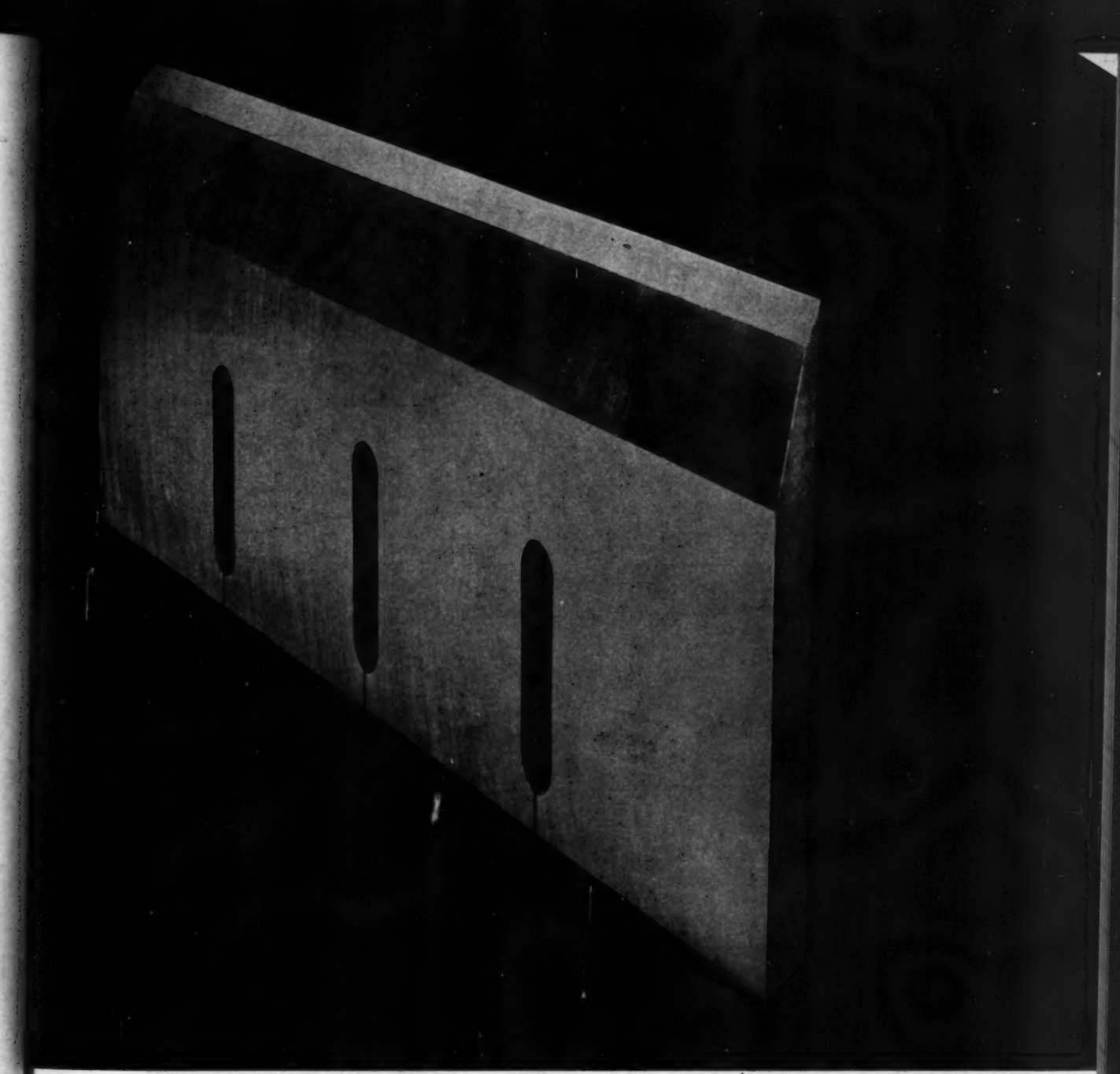
Roy E. Larsen, president of Time, Inc., announced this week that the company would acquire the Maine Seaboard Paper Company of Bucksport, Me., from Coffin & Burr, Inc., and the First Boston Corporation, as part of a transaction involving acquisition by the latter of all industrial properties of New England Industries, Inc. The consideration, according to earlier reports, was set at $6,000,000, of which $1,900,000 is debts assumed by the buyer. It is planned to turn the property over for operation to a company now supplying paper to the publisher.

"Time, Inc., is acquiring this outstanding papermaking property, built in 1930 and backed up by more than 600 square miles of timberland, as a source of additional paper for Time and Life," Mr. Larsen said. "The mill is now operating on newsprint and has contracts for the delivery of a major portion of its capacity through the next year or two. In the meanwhile, a substantial improvement program will be developed and carried out as circumstances permit.

"Time, Inc., has purchased substantially all of its paper heretofore under long-term contracts with leading paper maanufacturers. In accordance with this policy, it may be anticipated that one of these manufacturers would become associated with Time, Inc., in the further development and conversion of this mill to higher grades of paper.

St. Regis Makes $15,000,000 Loan

The St. Regis Paper Company has announced the sale of $15,000,000 of 3% debentures due in 1965 to Metropolitan Life Insurance Company, John Hancock Mutual Life Insurance Company, and Aetna Life Insurance Company on a basis to yield 2.90%. The debentures call for a semi-annual sinking fund of $225,000.



Simple arithmetic dictates

Anyone who adds up the many advantages of using Heppenstall Chipper Knives—mills that keep close check on the cost of chipping logs—must reach one irrefutable answer . . . *Heppenstall E.I.S. Chipper Knives show a unit cost below any other brand on the market.*

This fact has been thoroughly demonstrated over a period of many years and Heppenstall *guarantees* that in *your* mill under *your own* operating conditions, their knives will perform better and more economically than any other make. What more can you ask? Write for quotation. Heppenstall Company, Pittsburgh, Pa.

HEPPENSTALL

E.I.S. CHIPPER KNIVES

Paper winders of every size and type will develop their top capacity with fewer breaks and control troubles when equipped with G-E winder drives.

From the simplest a-c drive to the newest amplidyne-regulated d-c drive with regenerative tension control, these G-E equipments are based on long-term, practical experience with paper-mill operations. Close liaison with machine builders assures a well-matched combination of winder, gear-reduction unit, motor, and control.

G-E application engineers, who know the problems of paper-mill electrification, will be glad to work with you or your consulting engineers on this or any other paper-mill drive problem. *Apparatus Dept., General Electric Company, Schenectady 5, New York.*

FOR TOP-SPEED WINDING WITHOUT A BREAK

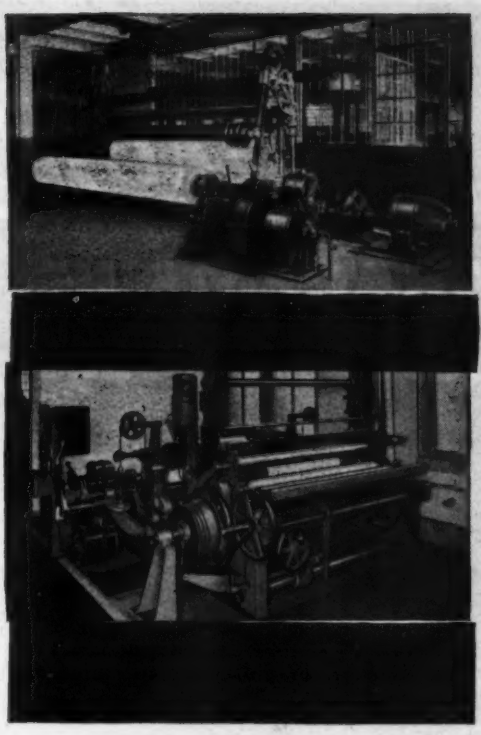
D-C WINDER DRIVE WITH regenerative tension control

This modern type of winder drive speeds output and assures a roll of uniform density from start to finish. Paper tension is held constant at all times, including the acceleration and deceleration periods.

D-c, adjustable-voltage drives—For single- or double-motor winders where tension-control can be adequately maintained by mechanical means, G.E. furnishes complete drives from 20 to 400 hp, including motor-generator set, d-c motors, and 50-division generator-field control. A factory-assembled control panel includes all the necessary contactors, overload relays, and resistors.

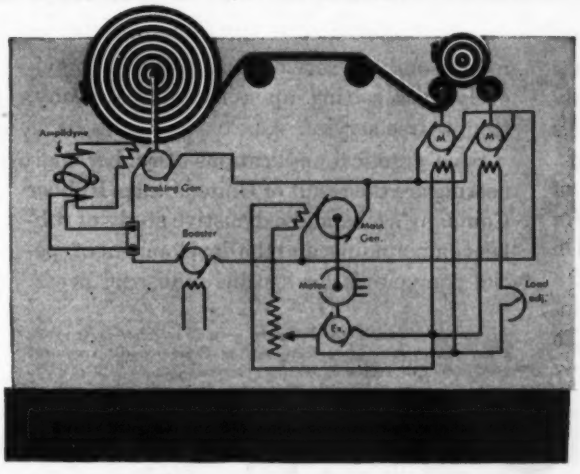
A-c wound-rotor drives—on winders where speed control need not be critical over a wide range, G.E. supplies drives powered by a-c wound-rotor motors, with simple, long-lasting drum-type controllers.

Electronic side-register control for winders, slitters—A photo-electric scanning head directed at the edge of the sheet detects any variation in position. A G-E amplidyne powers a motor which corrects the roll position (see photo at right).



Tension can be adjusted precisely by a dial on the operator's panel. An amplidyne and booster-generator unit maintains stalled tension, aids smooth starts, and thus avoids paper breaks.

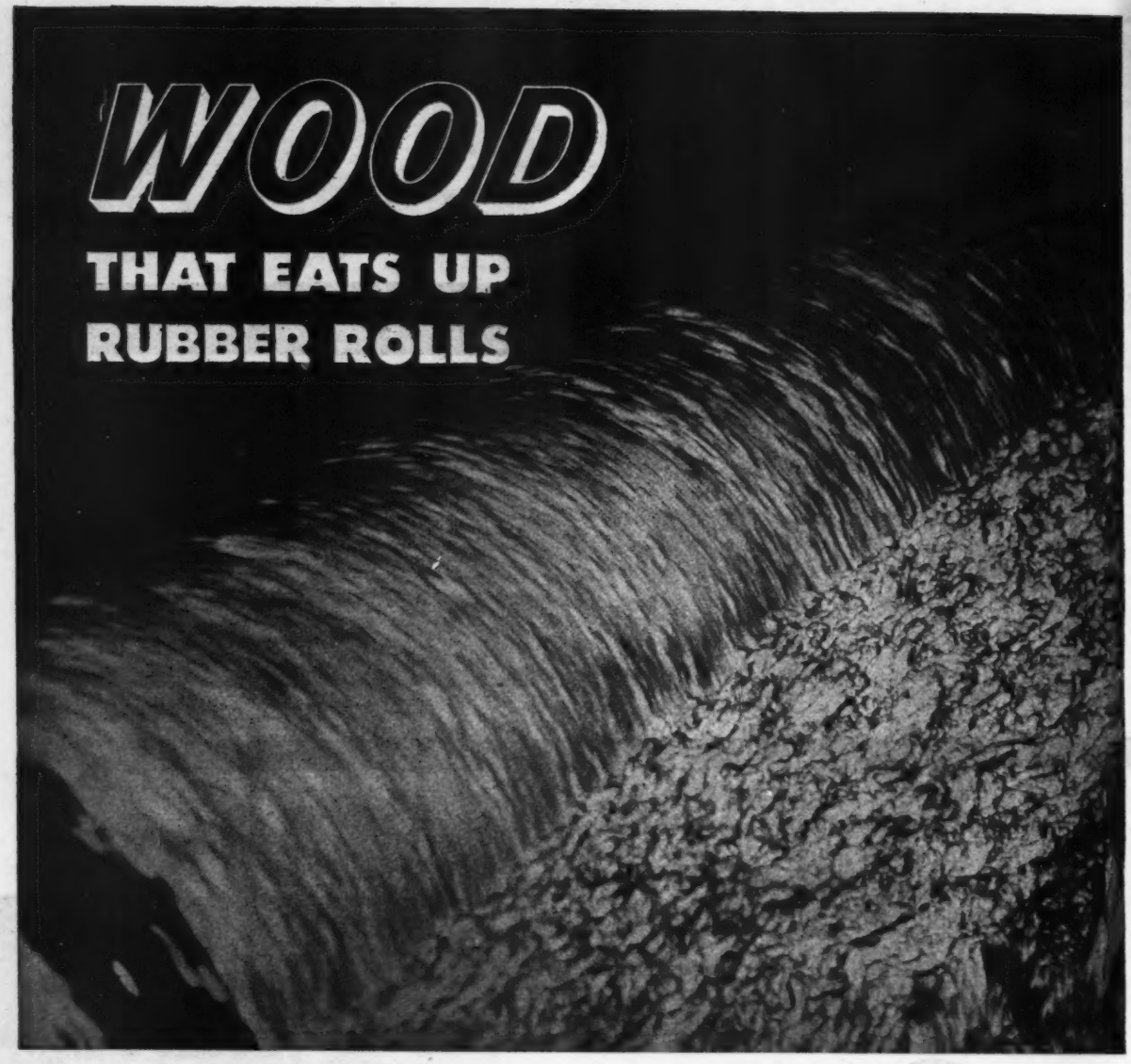
A factory-assembled main control panel, and a metal-enclosed operator's panel conveniently located, are included in the complete drive.



Side view of winder, showing convenient operator's control panel for regulating speed and tension

Keep buying **BONDS**—*and keep all you buy*

GENERAL ELECTRIC



In this paper mill, it was found that the decker couch rolls were literally "eaten up" by certain materials inherent in the ground wood stock.

After several such rolls, made of natural rubber, had disintegrated, U.S. Rubber Engineers were consulted. On their recommendation, a roll fabricated of a special synthetic rubber compound was installed. This proved entirely "indigestible" to the wood stock...has already delivered many more months of service than rolls tried previously . . . is setting up a record for steady, trouble-free service.

Such practical applications of rubber engineering are the result of United States Rubber Company's long and exhaustive study of rubber compounding, and the development of special compounds for specific industrial needs.

• • •

Listen to "Science Looks Forward"—new series of talks by the great scientists of America — on the Philharmonic-Symphony Program. CBS network, Sunday afternoon 3:00 to 4:30 E.W.T.

SERVING THROUGH SCIENCE US *WITH ENGINEERED RUBBER*

UNITED STATES RUBBER COMPANY

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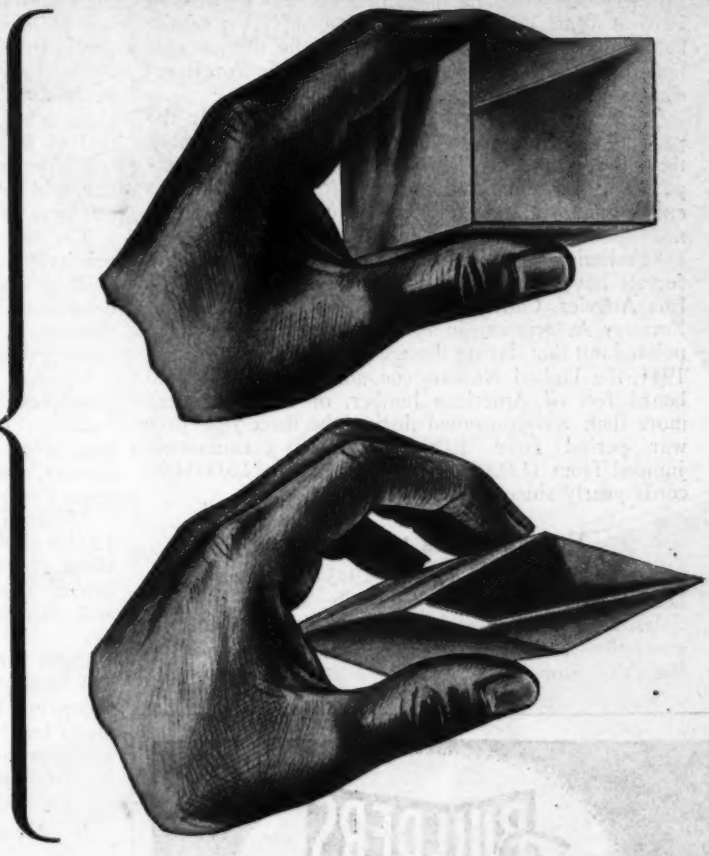
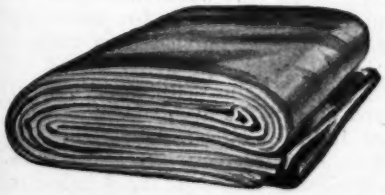
ILLUSTRATING THE OBVIOUS



THE outside measurements of both cartons are the same. The carrying capacity of the square carton is more than double that of the one that is distorted.



Any distortion of the size and shape of the interstices between the threads of a felt reduces the capacity of the felt to carry off water and results in spotty drying. This, in turn, slows down the speed of the machine, increases the amount of steam needed at the drier rolls, causes excessive broke and impairs the quality of the finished paper. One reason why Hamilton Felts remove more water in less time and deliver uniformly dried sheets is because Hamilton Felts are woven at uniform tension, warp and weft. They therefore, exert uniform tension over the entire surface of contact, *preventing distortion of the mesh* and avoiding the necessity for frequent stops for adjustment. Verify this in your own mill. Equip any of your paper machines with a Hamilton Felt. Speed it up. Keep a record of the increased tonnage it produces. Note the saving in steam, the reduction of broke, the better formation of your finished product.

• From the thinnest tissue to the heaviest board there is a Hamilton Felt that will do your work better, faster and at lower cost.

SHULER & BENNINGHOFEN, HAMILTON, OHIO

• Miami Woolen Mills •

Hamilton Felts

• Established 1858 •

Calls American Forestry Congress

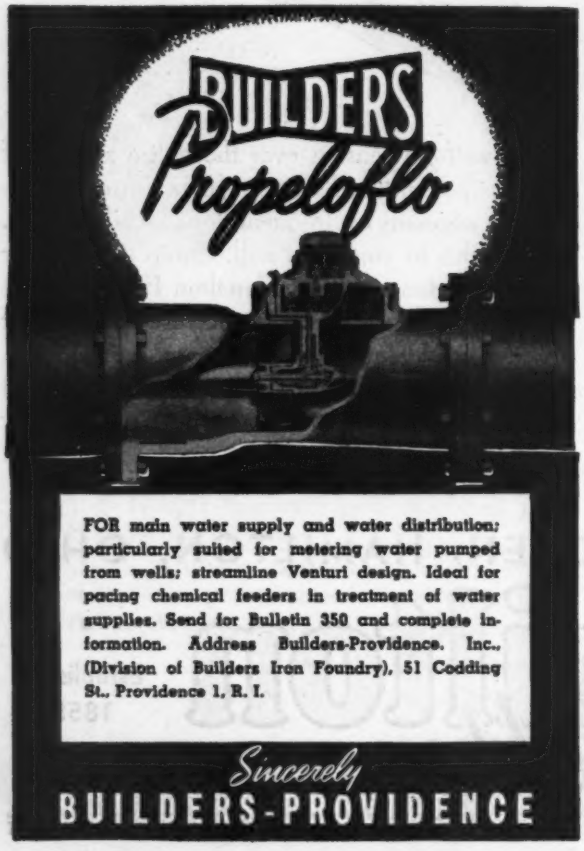
WASHINGTON, D. C., October 10, 1945—An American forestry congress to formulate a postwar conservation program for the nation's 630,000,000 acres of forest land was announced today by the American Forestry Association. The congress will be held in 1946 at Washington, D. C., upon completion of the nation-wide survey now being made by the association of the effect of war drains upon the forest resources of the country.

This survey, which has been in progress for the past twenty months, will reveal how much timber there is in each state, its location, character and composition, and will bring into relief forest conditions currently prevailing and lines of constructive action needed to safeguard and develop the resource.

"Preliminary reports indicate war drains on the forests have been heavy," said W. S. Rosecrans of Los Angeles, California, president of the American Forestry Association, in announcing the congress. He pointed out that during three war years, 1942 through 1944, the United Nations consumed 117,000,000,000 board feet of American lumber, or sixty per cent more than was consumed during the three-year prewar period from 1936. Pulpwood consumption jumped from 11,000,000 cords in 1939 to 16,000,000 cords yearly since 1941."

Forrest Goes to Winnipeg

SASKATOON, B. C., Oct. 6, 1945—A. Forrest has been transferred to Winnipeg by the Mid-West Paper Sales, Ltd., as the manager in that city. He will be succeeded as manager of the Saskatoon branch by Rutter C. Stonehouse.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FOR main water supply and water distribution; particularly suited for metering water pumped from wells; streamline Venturi design. Ideal for pacing chemical feeders in treatment of water supplies. Send for Bulletin 350 and complete information. Address Builders-Providence, Inc., (Division of Builders Iron Foundry), 51 Codding St., Providence 1, R. I.
Sincerely
BUILDERS-PROVIDENCE

Mando Starts Filtration Plant

INTERNATIONAL FALLS, Minn., Oct. 9, 1945—Construction of a filtration plant has been started by Minnesota and Ontario Paper Company to provide its mill here with an abundance of clear, pure water for the manufacture of "high brightness" papers requiring bleached stock, it is announced by Donald D. Davis, president.

The project, Mr. Davis explained, is part of the $6,000,000 Mando expansion and modernization program which envisions, among other things, production of finger grades of paper. The filtration plant will have an initial capacity of 15,000,000 gallons per day, and provisions are made for increasing the output to 30,000,000 gallons as operations expand.

The water treating facilities are being installed primarily to serve the bleaching plant, which will be built as soon as equipment and construction materials become available. Plans call for bleaching kraft, sulphite and groundwood—all the types of pulp used in paper production at International Falls.

Mando's new plant will be built and operated on principles of the patented permutit system of filtering. Industrial engineers of Hardy S. Ferguson and Company, New York, designed the unit and Mando engineers are overseeing installations. Paul A. Laurence Company is doing the construction work.

The project will require a brick and steel building 129 by 180 feet in size, with one portion three stories above ground. The higher part will contain bins for storing the chemicals and equipment for unloading and transporting the material purchased in carload lots.

Plans call for precipitators or settling basins that will occupy an area 70 by 123 feet and filter beds occupying a space 129 by 32 feet. Underlying the filters but having a much larger cross-section will be a reinforced concrete chamber to store the clean water for use as needed in the bleaching plant.

Newton Starts Its Hydrapulper

HOLYOKE, Mass., October 6—The Newton Paper Company is putting into operation at once its new hydrapulper beating equipment. This installation which was finished this week is the second of its kind in Holyoke. The Riverside division of American Writing Paper Corporation put one in recently.

The Dilts Machine Company of Fulton, N. Y., made and installed the new beaters. They will be used for very coarse pulp.

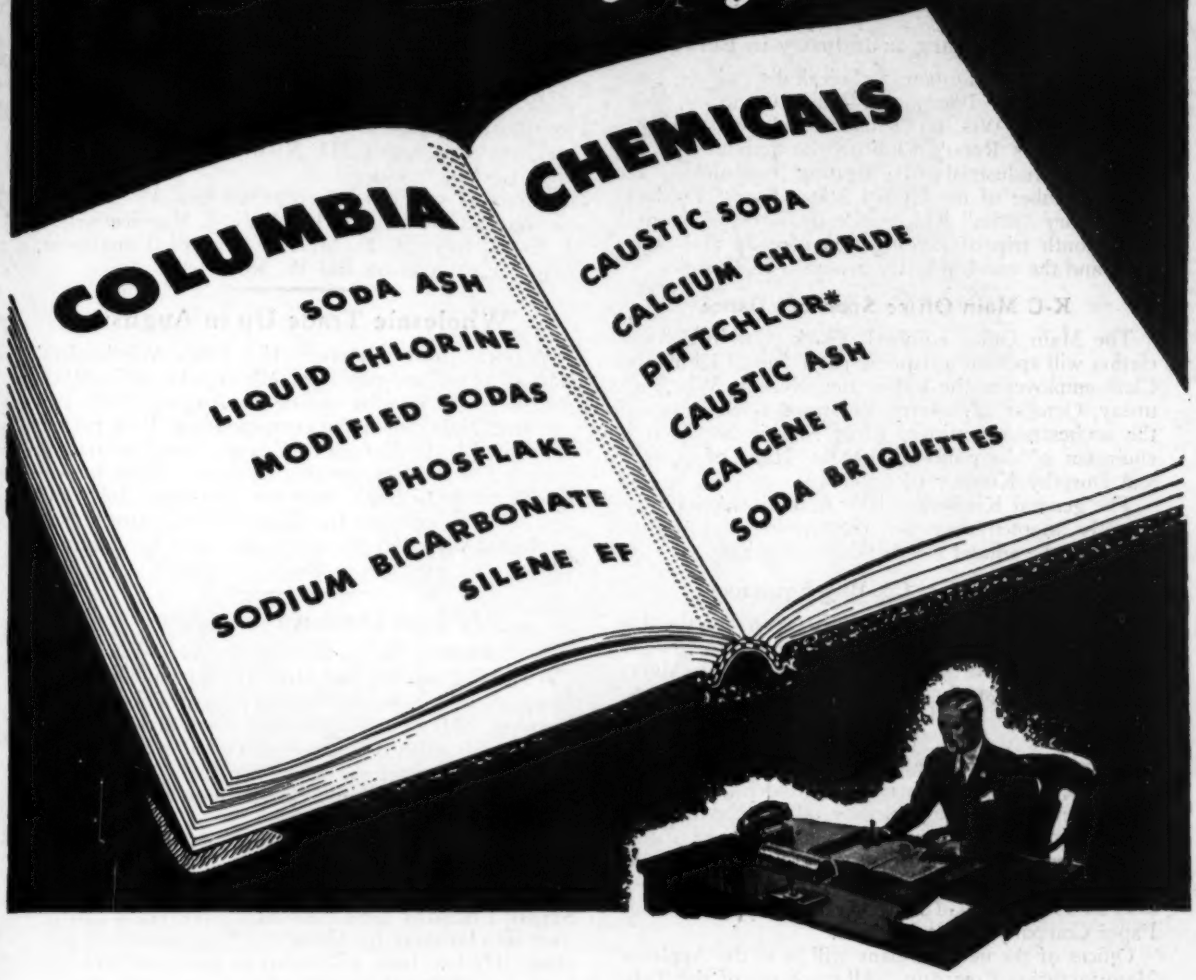
James N. Logan, treasurer of the Newton Paper Company, said today that some auxiliary equipment has been ordered to speed up present machinery. This is expected to be ready within six months. After that is in operation the Newton management will buy a new machine to build the plant into a three-machine mill.

The Newton has reintroduced a prewar line known in the trade as a bristol printing sheet and is swamped with orders.

Herb and Ashby Visit East

NEW WESTMINSTER, B. C., Oct. 6, 1945—Elmer Herb, president of the Westminster Paper Company, Ltd., and John Ashby, technical director of the company, have left on a four-week visit to eastern Canadian points. During the trip, they are seeking information regarding high-speed equipment which it is proposed to shortly install in the new plant now under construction for the company at New Westminster.

A Good List for Your Book



Columbia's modern production processes are carefully controlled . . . packaging and shipping are efficiently planned and supervised » Columbia plants are favorably located . . . distribution facilities are organized for excellent service » Columbia policies contribute to enduring business relationships.

That's why Columbia alkalies and related chemical products constitute a "good list for your book."

High Test Calcium Hypochlorite

COLUMBIA CHEMICALS

PITTSBURGH PLATE GLASS COMPANY
COLUMBIA CHEMICAL DIVISION
GRANT BUILDING • PITTSBURGH 19, PA.

CHICAGO • BOSTON • ST. LOUIS • PITTSBURGH • NEW YORK • CINCINNATI • CLEVELAND
PHILADELPHIA • MINNEAPOLIS • CHARLOTTE • SAN FRANCISCO

KIMBERLY-CLARK TO ENLARGE PLANT

(Continued from page 9)

It had good printing qualities and laymen were unable to tell the difference between the paper made from hardwood pulp and that made of the conventional pulp.

Addresses Rotary on Industry in Europe

Gilbert K. Dickerman, technical director of Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., on October 3 addressed the Wisconsin Rapids Rotary Club on the activities of the Technical Industrial Investigating committee. He was a member of the United States Forest Products Laboratory "team" which recently returned from a four-month trip of investigation of pulp and paper mills and the wood industry generally in Europe.

K-C Main Office Sponsors Dance

The Main Office Kimberly-Clark Activities Association will sponsor a dancing party for all Kimberly-Clark employes at the Valley Inn, Neenah, Wis., Saturday, October 27. Jerry Verstegen is chairman of the orchestra committee, while Starkie Swenson is chairman of decorations, Dorothy Huus of posters, and Dorothy Korotev of publicity.

The general Kimberly-Clark Activities Association recently adopted a revised constitution and charted plans for the annual membership campaign.

Appleton Mfg. Co. Buy Equipment

Ted. J. Holzem, president and treasurer of the Appleton Manufacturing Company, and Morrow B. Herner, Appleton, have purchased the machinery equipment and stock of the Mack Paper Tube and Core Company, Appleton, Wis., Mr. Holzem announced last week. Mr. Holzem is president and treasurer of the new company; Mrs. Elda E. Holzem, secretary, and Mr. Herner, vice-president.

The new owners have already taken over the company, which makes paper tubes and cores used mainly by paper mills. They purchased the plant from J. W. McLaughlin, Neenah, Wis., who organized the business in 1936 and had his office at the John Strange Paper Company, Menasha, Wis.

Offices of the new company will be at the Appleton Manufacturing Company. All employes of the Tube and Core company will remain under the new management and employment policies will remain the same.

Safety Suggestions Are Increasing

Since the Thilmany Pulp and Paper Company, Kaukauna, Wis., started a system about a year ago to encourage suggestions from employes on improved safety conditions, eliminations of waste, increased production and similar advantages to the mill and its employes, 119 such suggestions have been made.

A committee makes awards on the basis of the value of the suggestion, with a minimum of $5 for every suggestion adopted. Nineteen awards have been made out of the 119 suggestions. The top award was $65. The committee meets weekly, except when there are not enough suggestions for consideration.

Neenah Gets "E" Award Four Times

For the fourth time in two years, employes of the Neenah Paper Company, Neenah, Wis., have received the Army-Navy E award. Robert P. Patterson, who succeeds Henry L. Stimson as secretary of war, sent a message announcing the award and praising the efforts which achieved it.

Columbia Re-elects Slate

BUENA VISTA, Va., September 29. 1945—Directors of the Columbia Paper Company, meeting in annual session here a few days ago, declared a dividend of $1 per share, plus 25 cents per share extra, payable November 15, 1945, to stockholders of record September 1, 1945.

Officers re-elected at the annual meeting of stockholders were Howard Trumbower, president; Frederick W. Ancona, vice-president; J. Frank Key, vice-president and general manager; M. D. McKee, secretary-treasurer, and C. D. Niswander, sales manager and assistant treasurer.

Directors re-elected were Frederick W. Ancona, George B. Garrett, John H. Healy, J. Maurice Kelley, J. Frank Key, M. D. McKee, Howard Trumbower, Harry E. Whitcomb and W. Roy Bell.

Wholesale Trade Up in August

WASHINGTON, October 15, 1945—Wholesalers' sales of paper and paper products totaled $57,929,000 for the eight months ending in August, 1945, two per cent higher than the corresponding 1944 period, according to the Bureau of Census, based on reports from a group of representative firms. Sales in August were $5,672,000, four per cent over July, and five per cent less than for August, 1944. Inventories in August were two per cent higher than for July, but 12 per cent less than in August last year.

John Sheldon Harrington

WATERTOWN, N. Y., October 5, 1945—John Sheldon Harrington, 59, died Monday night in the Mercy Hospital, where he had been a patient since Sunday morning. Mr. Harrington had been ill since early spring with a heart ailment. Funeral services were held at the home of his sister, Mrs. H. V. Allen, Sr., Hoosick Falls, Friday. Burial was made in the Hoosick Falls cemetery.

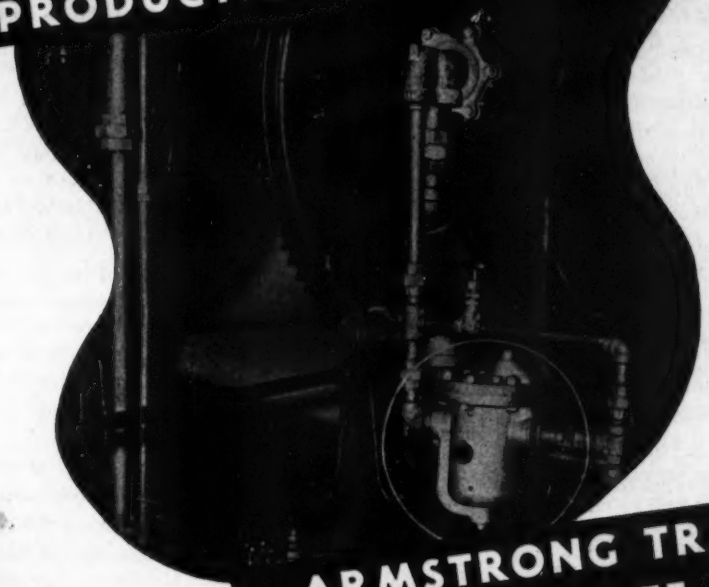
Mr. Harrington at one time was employed as an accountant for the Dexter Sulphite, Pulp and Paper Company, Dexter and as a salesman for the Kamargo Supply Company here. About twelve years ago he went into business for himself, selling paper mill supplies. He had been associated as salesman with the Lockport Felt Company, Newfane; Woodward-Baldwin Company, Baltimore, Md., and the Cheney Bigelow Wire Works Company in Boston, Mass. Mr. Harrington traveled throughout Northern New York and the New England States in his business.

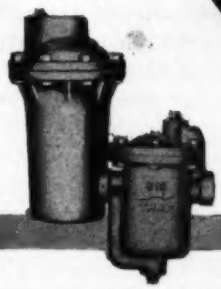
Robert Morse Thompson

HOLYOKE, Mass., October 6—Robert Morse Thompson died at the Holyoke hospital Wednesday after a short illness. He was born in Lawrence, the son of Robert and Amy Morse Thompson, coming to Holyoke with his parents when a child. He has resided here for the past 50 years. He was assistant chief engineer at the American Writing Paper Company, having been connected with that company for the past 40 years. He was a member of the Second Congregational church and a past member of the William Whiting lodge of Masons. He was also a member of the Holyoke Caledonian Benefit club.

He leaves his wife, Mrs. Alice Newell Thompson, one son, Robert M. Thompson, Jr., at home; two daughters, Mrs. Clyde G. Hayden of Biddeford, Me., and Mrs. John F. Howe at home, and three grandchildren.

Faulty Drying LIMITS PAPER PRODUCTION





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TRADE JOURNAL
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W. L. Cook, Editor

FIBROUS MATERIALS STOCKS LOW

Fibrous materials inventories are low at the mills but prospects are good for a steady improvement to provide an adequate margin of supply above high current consumption. The over-all charted trends of pulpwood receipts is downward, with total inventories upward in the South and slightly down in the Pacific Northwest area. Receipts of rough wood in the seven-month period of 1945 aggregated 9,966,000 cords, compared with 9,994,000 cords in 1944, and with 8,431,000 cords in 1943; the decline in receipts thus far in 1945 has been 0.3% below 1944. Total consumption of pulpwood in the period, of 10,002,000 cords, compares with 9,580,000 cords in 1944, and with 9,173,000 cords in 1943, indicating an increase in consumption of 4.4% in 1945 above 1944. Total inventories in the same period of 1945 were 2,627,000 cords, compared with 3,138,000 cords in 1944, and with 2,739,000 cords in 1943. This is a decline of 16.3%, the largest drop being in the South with 36.5%, while inventories in the Northeast region increased 0.6%.

In the charted trend of unbleached sulphite wood pulp, reported by the Department of Commerce, domestic production, consumption and exports are downward, with exports sharply upward. Total wood pulp production for the seven-months of 1945 were 6,032,000 tons, compared with 5,797,000 tons in 1944, an increase of 2.3%; imports totaled 609,000 tons, compared with 627,000 tons in 1944, a decline of 2.9%. Exports amounted to 118,000 tons, compared with 113,000 tons in 1944, an increase of 4.4%. Total wood pulp inventories for the seven months of 1945 were 377,000 tons, compared with 405,000 tons in 1944, a decline of 6.9%.

Mill receipts of waste fibrous materials totaled 4,656,000 tons in the seven-month period of 1945, compared with 4,850,000 tons in 1944, a decline of 4.0%; consumption totaled 4,850,000 tons, compared with 4,848,000 tons in 1944, effecting an approximate balance; inventories amounted to 637,000 tons in 1945, compared with 734,000 tons in 1944, showing a decline in 1945 of 13.2%. Total receipts of waste paper were 4,065,000 tons, compared with 4,087,000 tons in 1944, giving an approximate balance; consumption totaled 4,042,000 tons, compared with 4,018,000 tons, a decline of 0.6%, while inventories totaled 330,000 tons, compared with 316,000 tons, indicated an increase of 4.4%.

Rag receipts at the mills in the seven-month period in 1945 were 225,000 tons, compared with 261,000 tons in 1944, a decline of 13.8%; consumption totaled 241,000 tons, compared with 250,000 tons in 1944, a decline of 3.6%, while mill inventories totaled 63,000 tons, compared with 80,000 tons in 1944, a decline of 21.3%.

The current outlook for pulpwood is good for a steady improvement. Some obstacles of a temporary character are reported, such as the withdrawal of war prisoners from the South and the slow movement of labor from more profitable factory work to the woods. Despite these factors a favorable increase in wood receipts is quite widely expected. Improvement in the new supply of wood pulp is thus favorable, as imports of Swedish pulp are expected to amount to about 75,000 tons monthly for some time.

PAPER INDUSTRY PROSPECTS BRIGHT

In its review of the state of operations of the paper industry, now and in the immediate future, the Department of Commerce is optimistic. It reports that almost overnight, positive action on long range planning has displaced wartime hand-to-mouth operations. Already some concerns have announced their post-war objectives and many more are expected to take similar aggressive action in that direction. Alert and progressive leadership of this character will exert a tremendous influence in terms of production and purchasing power toward the common American goal of greater employment and more goods for more people. Capital expenditures throughout the industry will be large, resulting in considerable construction and a large demand for machinery and equipment. In fact, the Department states, estimates made in June indicated that the paper and allied products industries, plus the printing and publishing group, anticipated capital outlays in the twelve months after VE-Day of about $530,000,000, compared with $136,000,000 in 1939. These plans, when consummated, will undoubtedly result in a larger, more efficient production at relatively lower costs per unit of output.

In reference to the prospect of a larger and more efficient paper industry, the Department states in part that: Technical advances and new product developments will be prominent. Numerous factors are involved in this significant transitional period, one of the most important being the matter of long range raw material supplies in the basic form of the forest resources. More emphasis must be placed upon cooperative industry-Government planning toward sound forestry practices and sustained forest yield, as well as other significant matters of interest to Government and business alike. Wood pulp supplies probably will continue tight with a gradual easing as inventories are reestablished and imports from overseas gain greater momentum. It is likely to be a year or more when overseas imports are resumed in larger volume, before a peacetime competitive pulp market in the United States is again fully apparent. It is generally expected that most grades of paper and paperboard will continue in strong demand right through the transition period but with newsprint remaining in short supply for some time ahead.

Newsprint Production Increases

Production in Canada during September 1945 amounted to 269,963 tons and shipments to 277,018 tons, according to the News Print Service Bureau. Production in the United States was 56,722 tons and shipments were 59,802 tons. The output in Newfoundland was 27,861 tons and shipments were 21,105 tons making a total North American production of 354,546 tons and shipments of 357,925 tons. Total production in September 1944 was 331,214 tons and shipments were 345,124 tons. There was one working day less in September 1945 than in September last year.

The Canadian mills produced 140,395 tons more in the first nine months of 1945 than in the first nine months of 1944, which was an increase of 6.3%. The output in the United States was 3,923 tons or 0.7% more than in the first nine months of 1944; in Newfoundland production was 46,018 tons or 23.1% more, making a total increase of 190,336 tons, or 6.4% more than in the first nine months of 1944.

Stocks of news print paper at the end of September were 62,156 tons at Canadian mills, 4,746 tons at United States mills, and 50,923 tons at Newfoundland mills, making a combined total of 117,825 tons compared with 121,204 tons on August 31, 1945, and 103,788 tons at the end of September 1944.

Turkey to Increase Paper Output

Washington, D. C., October 1, 1945—About a third of the paper requirements of Turkey are now being met by the production of the two paper mills at Izmit says a report to the Department of Commerce. Although their present output is not definitely known it is thought to approximate 20,000 tons annually. The industry hopes ultimately to be able to supply up to 70% of domestic needs. The remaining 30% made up of special papers in which Turkish manufacturers have no interest, will be imported. Production will be increased by the enlargement of the two existing mills and the construction of a third.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1945		Corresponding Weeks—1944	
Sept. 1	95.2	Sept. 2	89.4
Sept. 8	75.9	Sept. 9	74.4
Sept. 15	94.0	Sept. 16	92.8
Sept. 22	94.3	Sept. 23	91.9
Sept. 29 (Revised)	98.1	Sept. 30	93.5
Oct. 6	*97.6*	Oct. 7	93.4

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1944	88.7	88.5	88.1	87.6	88.7	89.8	80.3	90.6	88.2	92.5	90.6	92.4	88.1
1945	86.7	89.4	90.2	88.1	89.8	91.2	80.8	88.6	*90.2*				

COMPARATIVE YEARLY SUMMARIES

	1938	1939	1940	1941	1942	1943	1944	1945
Year to date	69.9	80.1	86.2	95.4	92.0	88.2	88.0	*88.4*
Year Average	71.5	83.4	85.6	97.4	90.4	87.8	88.1	

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS†

Current Weeks—1945		Corresponding Weeks—1944	
Sept. 1	97	Sept. 2	97
Sept. 8	80	Sept. 9	80
Sept. 15	96	Sept. 16	97
Sept. 22	93	Sept. 23	96
Sept. 29	96	Sept. 30	95
Oct. 6	95	Oct. 7	96

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1944	90	96	95	96	96	96	85	96	92	95	95	85	93
1945	91	95	97	97	96	96	86	90	*91*				

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.

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Instrumentation Studies. LI*

Penetration of Papers by Water Vapor. V.[1]

Methods for Measuring Vapor and Gas Permeability—a Bibliographical Study

By the Staff of The Institute of Paper Chemistry

Halladay, John F. An engineering approach to solution of packaging problems involving moisture vapor resistance. *Paper Trade J.* 115, No. 14:79-88 (Oct. 1, 1942); *Tech. Assoc. Papers* 26:415-424 (June, 1943); *B. I. P. C.* 13:112.—Water vapor testing methods are discussed briefly and their relation in perspective to the whole problem of moisture-vapor resistant materials is appraised. A method for interpreting laboratory data from moisture-vapor resistance membrane tests, based on mathematical handling alone, is developed. A method for evaluating closure methods is described. A routine for determining the effect of vapor stresses produced by the contained product is outlined. The article does not lend itself to a brief abstract.

Harvey, Arthur R. Method of testing board for moistureproofness. *Paper Trade J.* 78, No. 26:50-52 (June 26, 1924); *T. S.* 79:219.—A sample of the board, having an area of 33 sq. in., is sealed around a triangular frame of light tin. The box thus formed contains on its bottom a piece of felt saturated with water. The sample is placed on a tray 21 inches in diameter, revolving at 17.5 r.p.m., enclosed in an airtight chamber surrounded by a thermostatically controlled water bath kept at 77° F. The samples are allowed to season for 1 hour, weighed, run in the chamber for 2.5 to 5 hours, and the loss of water determined by weighing again. Results are expressed as "% moistureproofness," 100% being equal to no penetration of water and zero being arbitrarily taken as a penetration of 0.4 gram per sq. in. per 24 hours, representing approximately the penetration through a common grade of patent white chip backboard.

Herfeld, H. The permeability to water vapor of leather and leather substitutes. *Collegium* 1941:65-73; *C. A.* 35:5743.—A beaker containing 50 ml. of water, with a cover holding the sample of leather to be examined (the free surface is about 36 mm. in diameter), is weighed, placed in a desiccator with sulphuric acid, and weighed every 24 hours. The "permeability index" is the number of milligrams of water vapor which pass through the leather sample of 1000 sq. mm. of surface in 24 hours.

Herfeld, H., and Schubert, R. Investigational procedures for leather-substitute materials. *Kunststoffe* 31, No. 5:169-181 (May, 1941); *C. A.* 35:7060.—On page 178 of this article the method of Herfeld is described.

Hermann, D. B. Diffusion of water through organic insulating materials. *Bell Laboratories Record* 13, No. 2:45-48 (Oct., 1934); *Rubber Age* (N. Y.) 36, No. 2:73-74, 78 (Nov., 1934); *C. A.* 29:1174.—A method for measuring the passage of water through substances is described and illustrated. The principle is to determine the rate of diffusion from a cell sealed with a layer of substance into a space with a lower concentration of water vapor—i. e., with a drying agent. With various modifications, rigid and semirigid substances, those which exhibit cold flow, and those with a very low diffusivity can be tested. Representative results on hydrocarbon wax, thiokol, asphalt, guttapercha, polystyrene, phenol fiber, soft vulcanized rubber, benzylcellulose, and cellulose acetate are given to show the enormous differences in diffusivity. Thus, moisture passed 1600 times as fast through cellulose acetate as through hydrocarbon wax. Most materials obey the linear diffusion law of Fick. Abrams and Brabender suggest that the lack of convection apparently associated with this method may give results differing considerably from those obtained where there is a suitable movement of air over the sample.

Hicks, E. W., and Mellor, J. D. Note on the resistance of wrapping materials to the passage of water vapor. *J. Council Sci. Ind. Research* 13:278-280 (1940); *C. A.* 35:1632; *B. I. P. C.* 11:283; *B. C. P. A.* 1941B, II:221.—In the usual method for determining the permeability of papers, etc., to water vapor, the use of 10% gelatin (or 20% for temperatures above 20° C.) has advantages over distilled water in the easier manipulation and the more accurate control of the size of the air gap between the test paper and the wet material.

Holwech, Wilhelm. The measurement of vapor transmission through paper. *Papir-J.* 20, No. 21:233-234 (Dec. 15, 1932); *C. A.* 27:1165; *B. I. P. C.* 3:144; *T. S.* 97:132.—The practical requirement that the paper should separate a region of high humidity from one of low humidity is met by stretching the paper over the top of a cylindrical glass vessel partly filled with water, and covering this with a bell jar in which is suspended a dish containing phosphorus pentoxide. When a dish 10 cm. in diameter is used, the free area of the paper should be 1 sq. dm. Weighings are made every hour for 6 to 8 hours.

*This report is one of a series issued as a part of the Instrumentation Program of the American Paper and Pulp Association.
[1] Continued from September 27, 1945.

Hobbs, Robert B. Measurement of the permeability of leather to water vapor. *J. Am. Leather Chem. Assoc.* 36:346-350 (1941); *C. A.* 35:7753.—A leather disk is sealed to the orifice of a vessel containing anhydrous magnesium perchlorate, which is placed in a chamber through which air is circulated at 72° F. and 65% relative humidity. Daily weight gain is determined. The transpiration rate thus found is shown to be more constant than the rate determined by previous methods.

Hyden, William L. Manufacture and properties of regenerated cellulose films. *Ind. Eng. Chem.* 21, No. 5:405-410 (May, 1929).—The moistureproof quality (of moistureproof cellophane) is determined by sealing a piece of the material to be tested over a glass dish containing water and determining the loss in weight when the test dish is placed in an air oven at 100° F. The air in the oven is circulated by a fan and desiccated by concentrated sulphuric acid kept in flat trays. By carrying out the test at 100° F., the rate of diffusion is much greater than at lower temperatures and the test is thus accelerated. The following values are given (mg. per sq. m. per hour): moistureproof cellophane, 270; waxed brown paper, 400; waxed glassine paper, 530; average of 15 waxed papers, 22,200.

Institute of Paper Chemistry. Instrumentation Studies. XLIV. Penetration of papers by water vapor. I. General discussion of the present status of measurement of water vapor permeability. *Paper Trade J.* 116, No. 14:11-15; No. 23:10-13 (April 8, June 10, 1943).—The salient facts about water vapor permeability are discussed briefly. The currently employed gravimetric method is carefully considered, and it is concluded that this method is subject, under certain conditions, to large errors. The change in volume of the testing unit and the corresponding change in buoyant force occasioned by change in barometric pressure are subjected to mathematical analysis, in the light of which tares employed in weighing are discussed. Under certain circumstances, the volume of the testing unit may change because of swelling of the test specimen. Because of the accidental existence of small "pinholes" or leaks, the weight of air confined in the testing unit or in the tare may change. In consideration of these defects, there appears to be no general procedure which will ensure, under all conditions, a good order of accuracy where highly moistureproof sheets are tested. Where it is desirable to employ water or saturated salt solutions in the testing unit, the diffusion resistance of the air space between the test specimen and the surface of the water or salt solution renders the test very insensitive where membranes of low moistureproofness are tested. In order that the property might be more fully explored, a different method is suggested for future investigations. The suggested method is of the "comparison" type, in which the water vapor permeability of the test specimen would be compared with that of a standard of diffusion resistance. Diagrams of suggested equipment are presented and technical details are discussed.

Institute of Paper Chemistry. Instrumentation Studies, XLV. Penetration of papers by water vapor. II. An electric sword hygrometer for measuring the relative humidity of air inside packages or other enclosures. *Paper Trade J.* 116, No. 24:16-19; 117, No. 1:12-15 (June 17, July 1, 1943).—To fill the need for the accurate testing of the state of dryness inside packages or other enclosures, an electric hygrometer which is satisfactory for this purpose has been developed. An essential feature of this hygrometer is its ability to withstand frequent contact with hard, dehydrated particles of food, and yet respond at a practicable rate of speed. The hygrometric element is a structural part of a sword or a lance, which can be driven easily into the package. Approximately 2 or 3 minutes after piercing a package, an accurate determination of the relative humidity of the air inside the package can be made. The instrument indicates a current which, through the use of calibration charts, provides a measurement of relative humidity. Details concerning the development of the method, the construction of the equipment, the calibration, and the operation of a portable instrument are given.

Institute of Paper Chemistry. Instrumentation Studies, XLIX. Penetration of papers by water vapor. III. Techniques for measuring water-vapor transfer—a progress report. *Tech. Assoc. Papers* 27:681-687 (June, 1944); *Paper Trade J.* 118, No. 2:23-29 (Jan. 13, 1944); *B.I.P.C.* 14:180, [Instrumentation Studies, XLIX].—The method for determining the water vapor permeability of sheet materials is a variation of the commonly used cup method. The specimens are prepared and the testing done in a room conditioned at 100°F. and 23% relative humidity. The cup over which the specimen is sealed contains a saturated salt solution which yields an equilibrium relative humidity of 92%. The cup is weighed periodically and its loss in weight is plotted as a function of the elapsed time of test. The water vapor permeability of the specimen is calculated from the slope of the linear portion of the resulting curve. Another section discusses the electric hygrometer control of relative humidity.

Institute of Paper Chemistry. Instrumentation Studies. L. Penetration of paper by water vapor. IV. Procedure for creasing specimens for water vapor permeability. *Tech Assoc. Papers* 27:687-688 (June, 1944); *Paper Trade J.* 118, No. 2:30-31 (Jan. 13, 1944); *B.I.P.C.* 14:181.—Complete details are given of a method of creasing a protective film or a paper which may be readily duplicated; this is intended to standardize one of the conditions of test for water vapor permeability.

Institute of Paper Chemistry. Penetration of papers by water vapor. V. Progress report on the development of two new electric methods for the measurement of water vapor permeability. Report No. 30 to the American Paper and Pulp Association, Part V. 1944. [To appear as Instrumentation Studies. LII]—This report describes the development of two nongravimetric methods which have evolved from a method suggested in Part I of this series of studies. These two methods are designated, respectively, as the "steady-state" and "dynamic" methods. In the steady-state method, the test specimen is sealed between a space of constant, high relative humidity and a narrow space of variable relative humidity. The latter space communicates with a large space (or room) of constant and known relative humidity through a variable, standard diffusion resistance. This resistance is varied to obtain a standard relative humidity in the narrow space between the specimen and the diffusion resistance. The relative humidity in the narrow space is indicated by a very small electric hygrometer. Under steady-state conditions, the water vapor permeability is expressed in terms of the setting of the diffusion resistance. In the dynamic method, the apparatus is modified by set-

ting the diffusion resistance at infinity, or by replacing the partition containing the diffusion resistance with a glass plate. In using this method, the time rate of increase of the relative humidity in the narrow space is measured with the small electric hygrometer located in that space.- The water vapor permeability is obtained from the observed rate. Both theory and observation show that the rate depends upon the water vapor absorption capacity of the portion of the specimen lying between the moistureproof barrier and the narrow space, as well as upon the steady-state water permeability. However, for a given type and grade of moistureproof sheet, there is a correlation between the observed rate and the permeability as determined by the gravimetric method. This method results in the greatest speed of testing thus far achieved, and is believed to be useful for mill control testing, in spite of the dependence of the result on moisture absorption characteristics of the specimen.

Institute of Paper Chemistry. Penetration of papers by water vapor. VI. Cabinet for water vapor permeability measurements. Report No. 30 to the American Paper and Pulp Association, Part VI. 1944. [To appear as Instrumentation Studies. LIII] — A cabinet has been designed which can be controlled over a wide range of relative humidities and temperatures and which is so constructed that the permeability cups may be weighed without removal from the cabinet. New specimens may be introduced and specimens which have been tested can be removed without essential change in the conditions within the cabinet. A detailed description is given of the method for the determination of relative humidity by the wet and dry bulb thermometer and the dew-point method.

Institute of Paper Chemistry. Penetration of papers by water vapor. VII. Progress report on the further development of a new electric "dynamic" method for the measurement of water vapor permeability. Report No. 30, Part VII, to American Paper and Pulp Association, Feb. 1, 1945. — The dynamic method can be a rapid, effective, and fairly accurate means for evaluating water vapor permeability. To achieve an accurate evaluation, recognition must be made of two factors in addition to the permeability of the specimens. These factors have a significant influence on the dynamic results. The first of these concerns the moisture-absorptive capacity of the material lying above the moisture-resistant barrier and disposed toward the test space. Absorptive material above the barrier lowers the rate of increase of the relative humidity in the test enclosure and, hence, a low dynamic result is obtained. A correction of dynamic results for the weight of the absorptive material of a specimen leads to a good correlation between the gravimetric and the dynamic methods. This correction can be applied easily through the use of a chart. The second factor concerns the moisture content of the specimen prior to testing. To obtain a good correlation between the dynamic and gravimetric methods, it is necessary to condition the specimen to a constant moisture content. The conditioning time will depend upon the type of moistureproof material.

Jenckel, Ernst, and Woltmann, Fritz. Determining the permeability of films of artificial materials to moisture. *Kunststoffe* 28:235-238 (1938); *C. A.* 33: 4343.—Accurate determination of the permeability of films made from synthetic materials requires that means (e.g., a current of dry air) be used to ensure that moisture cannot accumulate on the dry side of the foil under test. The rate of moisture diffusion through polystyrene films was approximately doubled on raising the temperature of the test from 20 to 40°C. Heating the polystyrene films to various temperatures between 60 and 85°C. and slowly cooling to room temperature increased or decreased the permeability to moisture depending on whether the films were held under tension or allowed to contract during heating.

John, Robert. Method for testing the water vapor transmission of paper. *Tech. Assoc. Papers* 20:90 (June, 1937).—The specimen, supported on a piston-ring ledge, is sealed within a Petri dish over 10 grams of 12-mesh calcium chloride (⅛ inch thick). The specimen is sealed in with a ring of wax poured in between the wall of the dish and a disk-shaped templet that is said to define the area (10 sq. in.) very exactly. The edge of the templet is sloped so that the top surface is larger than the bottom surface and it is covered with a film of grease, so that the templet can be withdrawn easily. The Petri dish with the membrane sealed in is inverted over a hole in a constant temperature (70°F.) water bath, exposing the specimen to water vapor arising from the water surface 1 inch below the specimen. After 24 hours of such exposure, the dish is removed, covered with a watch glass, and weighed. The dish is then returned to the water bath for an additional 24 hours and again weighed. The difference in weight is expressed in grams per 100 sq. in. per 24 hours, and is termed the "water vapor transmission."

Kaess, G. Testing the suitability of packaging materials as containers for cold storage goods. II. *Papier-Fabr. Wochbl. Papierfabr.* Sept., 1943, No. 6:203-215; *B.I.P.C.* 14:369 *C.A.* 38:4437.—Measurements were made with a large number of packaging materials with special reference to their water vapor permeability, air permeability, and folding endurance at 20° and —15° C. Studies were also made on their permeability to aromatic vapors and their resistance to water and grease penetration, the influence of fruit acids, and the bursting strength, wet and dry, at 20° C. Data, given in six comprehensive tables, show the usefulness or limitations of various packaging materials. The laboratory tests were correlated with the results of practical experience. The preservation of freshness of packaged goods appears correlated with the permeability to water vapor, air, and aromatic vapors of the packaging material. Under conditions ordinarily found in refrigerators, weight losses of 1 to 1.5% (which are permissible in the case of most cold storage goods) are not exceeded during the time period allotted to the test in the case of satisfactory packaging materials. A double-faced corrugated board, when used as an outer wrapper in conjunction with impregnated boxes, wrappers, or bag-in-a-box type inner containers, was found to be satisfactory, provided the inner containers showed a permeability to water vapor at —15° of about 25 mg./sq. dm. per day when measured by the method of Wolodkewitsch. When, however, the water vapor must be retained as far as possible by the packaging material, the limiting value should be 12 mg./sq. dm./day. In these measurements, that side of the packaging material which is to be exposed to the higher vapor pressure (usually at relative humidity of about 100) should be kept in contact with water vapor, provided the paper or foil is to be regarded as an outer wrapper. However, if wet goods are in

immediate contact with the packaging material, the latter should be in contact with water or ice when measurements are made. Because of varying "diffusion numbers" of papers or foils, water vapor permeability which has been measured at a higher temperature cannot be used in drawing conclusions regarding the permeabilities of the same materials at lower temperatures. No experiments were made to determine the permissible threshold values in the case of permeability to air or aromatic vapors. Only the general statement is made that these must be kept at a minimum. In judging the effect of the packaging material on the goods (and vice versa) as well as the mechanical requirements of the containers, reliance should be placed upon practical experience rather than laboratory data. Twenty-two recent references.

Kiermeier, Friedrich. Determination of the permeability of packaging materials to aromas. *Chem. Tech.* 16, No. 20:204-206 (Oct. 9, 1943); *B.I.P.C.* 14:181.—The author notes that foodstuffs deteriorate in quality not only from loss of flavor or aroma, but also by acquiring undesirable odors from other foods and materials. Hence, it is necessary to package foods in materials which are resistant to the passage of organic vapors, i.e., aromas, flavors, and odors. Because it is not feasible to test packaging materials for permeability to all the many components of odors and flavors, it is necessary to select a few which are typical of the more important compounds responsible for food odors. The author chose ethyl acetate, trimethylamine, naphthalene, and limonene (an essential oil found in lemons). Ethyl acetate was used because it is a typical aliphatic compound and is one of the more common esters found in fruits. Trimethylamine was selected as a typical component of fish odors. Naphthalene was chosen as representative of the solid compounds which sublime readily at normal temperatures. Limonene was taken to be typical of compounds which are not water soluble and which do not vaporize readily. The permeability of specimens to ethyl acetate was determined by sealing the specimen over the top of a metal cup containing a measured amount of an aqueous solution of ethyl acetate (0.5 g. per 100 ml.), storing the cup for a suitable interval, and then analyzing the remaining solution by oxidation with excess potassium bichromate to determine the residual amount of ethyl acetate. The permeability to trimethylamine was determined similarly; the original solution was analyzed by titration with 0.1 *N* hydrochloric acid. In both cases, correction was made for the loss from the solution due to vaporization in the air space inside the cup by carrying on a test with a cup closed by a disk of metal. The permeability of naphthalene was measured by impregnating a disk of filter paper with naphthalene, placing it between two disks of the membrane under study and sealing the edges. The rate of loss in weight of the assembly was determined. A control comprised of two disks of the membrane sealed together was also weighed to allow compensation for changes in moisture content which were unavoidable in a laboratory of uncontrolled relative humidity. The permeability to limonene was determined by sealing the specimen to a cup containing limonene and placing the cup and a crystallizing dish of concentrated sulphuric acid in a closed glass vessel. The vapor which passed through the membrane was absorbed by the acid and determined by oxidation with an excess of potassium dichromate. A table lists the permeabilities, expressed in mg. per sq. dm. per day, for sixteen samples.

Kleiber, Max, and Smith, F. R. Oxygen penetration test on the package itself. *Modern Packaging* 18, No. 5:118-119, 140 (Jan., 1945).—The method described is identical with that reported by Smith and Kleiber.

Kline, Gordon M. Permeability to moisture of synthetic resin finishes for aircraft. J. Research (Natl. Bur. Standards 18:235-249 (Feb., 1937). (RP974).—The film to be tested is sealed on a glass dish containing phosphorus pentoxide, water, or a saturated salt solution which will produce the desired relative humidity inside the cell. The cells are placed in a cabinet in which the temperature and relative humidity are controlled and are then weighed at approximately 3-day intervals until a constant for the moisture permeability has been established. Glass crystallizing dishes (Tanners special) were used for the cells. These dishes are 70 mm. in outside diameter, 50 mm. deep, and weigh approximately 35 grams. An aluminum ring of 57 mm. inside diameter and 87 mm. outside diameter was fastened to the rim of the dish (which is preferably rough ground) with cementyte of hard grade. A melted mixture of equal parts of beeswax and rosin was used to seal the outer edge of the dish to the metal. The disk cut from the film was attached to another aluminum ring with the beeswax-rosin mixture and subsequently sealed to the aluminum ring on the cell with the same material. The exposed area of the film was 25.5 sq. cm.

Lahey, Richard W. Testing containers for moisture-vapor transmission. *Chem. Eng. News* 22, No. 8:636, 638 (April 25, 1944); *B.I.P.C.* 14:332.—The author discusses the recent trends in the measurement of moisture-vapor transmission for the purpose of evaluating containers suitable for packaging hygroscopic materials. The laboratory permeability tests show the relative permeability of membranes under ideal conditions; however, this is not definite proof of the adequacy of containers fabricated of materials incorporating these films. The fabrication process might include bending, folding, stretching, sewing, gluing, etc. Transportation and storage involve rough handling and variations in temperature and humidity, the effects of which may not be comparable with the constant conditions of laboratory testing. Final tests, therefore, must be made with the actual product packed in standard size containers which should be treated so that handling and transportation abuses are duplicated. Accelerated moisture-vapor permeability tests of the filled and abused containers should then be made in a chamber conditioned at 95% relative humidity and 100°F., avoiding condensation on the containers. Weighing the containers at regular intervals will give an indication of the rate of moisture-vapor transmission. The product inside the container should be tested before packaging and after the tests are concluded. Determination should be made also of the maximum amount of moisture a product can absorb and still be acceptable to the trade. From these data, estimates can be made of the periods over which a container can provide satisfactory protection under varying climatic conditions.

Leach, W. G. Measurement of the water vapor permeability of wrapping materials. *Analyst* 66:241 (1941); *B.C.P.A.* 1941B, II; 259; *B.I.P.C.* 12:82.—A kidney-shaped glass bulb, made in two flanged parts holding the wrapping material between them,

is used. On one side it contains a solution of low relative humidity and on the other is attached a removable bulb containing a solution of high relative humidity. Relative permeabilities are determined by measuring rates of loss of weight by the latter bulb.

Lehmann-Oliva, W. Determination of the permeability of packing materials to water vapor. *Z ges. Kälte-Ind.* 47:191-193 (1940); *C.A.* 37:6749.—The abstract indicates that the apparatus is described.

Lehmann-Oliva, W. Diffusion of air humidity through cardboard and paper. *Z Ver. deut. Ing., Beiheft Folge* 1940, No. 1:25-31; *C.A.* 34:7107; *B.I.P.C.* 11:94; *B.C.P.A.* 1941 B, II: 235.—A method is described for the experimental determination of the diffusion constant. Experimental results are reported which agree well with calculated values. In general, a smooth surface was found to present a greater resistance to diffusion than a rough surface. Diagrams and data are given.

Levey, Harold A. The transmission of water vapor through cellulosic membranes. *Plastic Products* 11, No. 2:52-53 (Aug., 1934)—The method used was that developed by Hyden, Charch, and Abrams and consisted in establishing a known and constant humidity head or difference of water vapor concentration on each side of the membrane under test. The relative humidity was maintained at 50% and the temperature at 70° F. A small movement of air over the vessel was maintained constant at 200 linear feet per minute. The top of the vessel exposed an area of the membrane equipvalent to 50 sq. in. Measurements were made of the rate of water vapor transmission per 24 hours, for 2 days, 3 days, and 1 week. The amount of water vapor transmitted was computed from the loss in weight of the vessel containing water and covered with the membrane under test. Values are reported as grams of water vapor which passed through 100 sq. in. of exposed membrane per 24 hours at 70° F. and 50% relative humidity. Measurements were made also with vapors of liquids other than water and, except for those organic liquids which are solvents for cellulose derivatives, the rate of vapor transmission was in agreement with the vapor pressure of the organic liquid at the temperature employed. Data are given for tissue and glassine papers, vegetable parchment, regenerated cellulose, and films of cellulose esters and others.

Lismund, R. E., and Siddle, F. J. Permeability of protective (vanish) coatings to water vapor. *J. Oil Colour Chem. Assoc.* 24: 122-137 (1941); *C. A.* 35:7736.—Methods for measuring permeability are critically reviewed, and an improved apparatus is described in which streams of dry and moist air (under controlled relative humidity) at equal pressure are led over the surfaces of detached varnish films supported in a suitable cell. A microbalance is used to weigh the water vapor which penetrates. Initially, penetration is nil because of absorption; thereafter, readings taken at definite intervals show that with most materials the rate of penetration increases gradually and becomes constant after about 2 hours. The permeability is apparently proportional to the vapor-pressure differential on the two sides of the film, but does not appear to be inversely proportional to the film thickness, which should therefore be kept constant.

Moisture-vapor test cabinet. *Modern Packaging* 16, No. 3:78, 80, 82, 100 (Nov., 1942); *B. I. P. C.* 13:154.—An illustrated description is given of the General Foods moisture-vapor transmission test cabinet. The cabinet resembles somewhat an ordinary washing machine except that it is completely cylindrical and has a small control panel on one side. The cabinet contains a metal cylinder (equally spaced from the inside walls) inside of which is a series of equally spaced wire mesh shelves which carry the test dishes. Water is placed in the bottom of the cabinet to the depth of 1 inch. The temperature is maintained at 100° F. by an electric heater. The air is drawn over the water (by a motor-driven fan), passes by the heating element, up the annular space and back down through the center opening. The test dishes are not directly in the path of the moving stream of air, but the air stream causes an induced flow of slowly moving air in the space where the dishes are placed. The atmosphere is always close to 95% relative humidity at all parts of the sample storage space. Twelve samples can be tested in duplicate at one time. The test dishes are made of aluminum and are about 0.75 inch in over-all depth and give a sample area of 20.6 sq. in. When 50 cc. of calcium chloride are spread evenly over the bottom of the test dish, only a small space remains between the hygroscopic material and the sample being tested. The sample is a circular piece 5⅝ inches in diameter, which is sealed to the shoulders of the dish to provide a vapor-tight seal. After being conditioned for several hours, it is placed in a special desiccator for 4 hours, weighed, placed in the humidity cabinet for 68 hours, and again weighed. The difference in weight, multiplied by 1.71, gives the grams of moisture vapor transmitted by 100 sq. in. of sample per 24 hours at 100° F. and 95% relative humidity.

Morris, V. N. Permeability of rubber to air. II. Effect of stretch, thickness, milling, compounding ingredients, kind of crude rubber, and temperature of vulvanization. *Ind. Eng. Chem.* 23, No. 7:837-843 (July, 1931).

Morris, V. N., and Street, J. N. Permeability of rubber to air. I. Effect of temperature, pressure and humidity. *Ind. Eng. Chem.* 21, No. 12: 1215-1219 (Dec., 1929).—The second article describes a permemeter, which consists of two air chambers, set in rather heavy iron castings, which can be drawn together by means of a screw clamping arrangement. The sample is placed between the two chambers, and air under pressure is allowed to permeate into the second chamber through the sample. The changes in pressure were measured by means of a gage registering from 0 to 100 pounds. Mineral oil was used as a manometer fluid. Details of the apparatus and procedure are given. Slight changes in the apparatus are given in the first reference.

Nagel, Werner, and Brandenburger, Elisabeth. The titrimetric determination of the water premeability of insulating materials. *Korrosion u. Metallschutz* 16:94(1940); *Wiss. Veröffentl. Siemens-Werken* 18, No. 2:97-104 (1939); *C. A.* 33:8329; 35:8147; *B. I. P. C.* 10:327; *B. C. P. A.* 1939B; 957.—An apparatus is described in which the moisture passing through a film is carried by a current of dry air into an excess of naphthalenephosphonyl chloride, with which the water reacts and liberates hydrochloric acid; this, in turn, is absorbed in a known amount of barium hydroxide and the excess of the hydroxide is titrated. Cinnamyl chloride may be used in place of the other chloride. The apparatus, with suitable modification, may be used for either gaseous or liquid water through the films.

New method for testing gas permeability. *Modern*

Packaging 16, No. 6:84, 108(Feb., 1943).—The Fabric Permeater is described. It consists of four units. The waxing plates, to prepare the edge of the circular sample with a mixture of vaseline and beeswax. The cell, consisting of a hinged pair of castings between which the sample is clamped by means of a central screw. The lower casting is furnished with inlet and outlet fittings for the test gas, and the upper castings with a thermal conductivity gas analysis cell and a four-conductor cable for connection to the control box. The control box, which provides adjustment for the bridge current and electrical adjustment of the galvanometer zero. The galvanometer—a Spot galvanometer with self-contained lamp and a scale which is directly calibrated in terms of fabric permeability in liters per square meter per 24 hours for the particular gas to be used. A brief description of the method of test is given.

Noll, August. An apparatus for determining water vapor permeability. *Papier-Fabr. Wochbl. Papierfabr.* May, 1944, No. 5:151-153.—A simple equipment for making permeability measurements in quadruplicate consists of a desiccator containing sulphuric acid. The containers holding the water are small aluminum or magnalium cups over which the test sheets are stretched and clamped. The vapor permeability is recorded in grams per square meter per 24 hours.

Oguri, Sutezo, and Takei, Muneo. Penetration of water vapor through papers. *J. Soc. Chem. Ind., Japan* 41:Suppl. binding 295-297(1938); *C. A.* 33: 1932.—The rate of transmission of water vapor through paper attains a constant value when the sorption equilibrium is established, so that the amount of water transmitted through the sample increases linearly with time. The time required to reach the equilibrium varies with the thickness of the sample and the vapor pressure at which the test is made. The water vapor apparently penetrates the paper in two ways—passage of water vapor through the pores of the paper, and the combined effects of condensation, migration of water in the interior, and evaporation of water. The moisture permeability depends on the thickness and nature of the sample, and decreases quickly at first and then gradually with the increase in thickness. At low vapor pressures, permeability increases almost linearly with the vapor pressure but, when the vapor pressure approaches to saturated vapor pressures, the increase in permeability decreases with vapor pressure. This can be explained by assuming that, when vapor pressure approaches saturation, the diffusion of water vapor would be difficult because of changes in the structure of the material by swelling. When vapor pressure is constant and temperature is variable, the moisture permeability becomes larger with a decrease of temperature.

Oswin, C. R. Moisture-vapor barrier. *Chemistry and Industry* 63, No. 50: 429 (Dec. 16, 1944); *B. I. P. C.* 15:216.—It is suggested that a unit of Resistance to Aqueous Penetration be adopted, which would be defined as the millibars required to drive 1 gram of water through 1 square meter of the membrane in 24 hours. The present unit (grams of moisture permeating through 1 square meter of the wrapper in 1 day under an aqueous vapor tension gradient of 1 mm. of mercury) is not convenient in calculations of performance, nor is it easily understood, since consecutive improvements in permeability approach asymptotically to zero.

Oswin, C. R. The permeability of transparent wrappings. *J. Soc. Chem. Ind.* 62. No. 4:45-48 (April, 1943); *C. A.* 38:4065.—This paper gives values for the permeability of seams, joints, etc., but does not give the method used for their determination. It is of interest because of the general discussion of some of the methods and of the mechanism of permeability.

Payne, Henry F., and Gardner, Wm. H. Permeability of varnish films. *Ind. Eng. Chem.* 29, No. 8:893-898(Aug., 1937); *see also Payne*, H. F., Official Digest, Convention issue, Federation of Paint and Varnish Production Clubs, 1937.—The permeability cup was made from a metal stamping, to which was soldered a brass disk to form a flange at the top. Another brass disk was bolted to the one on the cup with six 3/16-inch bolts. The centers of the brass disks were so machined as to give a circular opening exactly 11.34 sq. cm. in area. The contracting surfaces of the disks were carefully ground by hand to optical flatness. The sample was fastened securely between the brass ring and the flange of the cup under a slight compression.

Rabak, William. Some observations on the materials used in packaging frozen foods. *Tech. Assoc. Papers* 24:534-536(June, 1941); *Paper Trade J.* 111, No. 9:80-82(Aug., 1940); *Converter* 14, No. 12:2-3, 26-27(Dec., 1940); *Paper Box and Bag Maker* 91, No. 5:92, 94; No. 6:112-113(May, June, 1941); *B. I. P. C.* 11:57; *C. A.* 34:8072.—The method of examination was that described by Tressler and Evers, which consists of the measurement of the amount of water vapor losses permitted by the various materials when interposed between an atmosphere of high relative humidity on one side and a 50% relative humidity on the other. The extent of the penetration was obtained by measuring the losses of moisture from the saturated atmosphere to the circulating atmosphere of 50% relative humidity at 70° F. over a 6-day period of exposure. The loss was determined by the increase in weight of anhydrous calcium chloride contained in low-form, ground-glass stoppered weighing bottles. The sample containers were spun from heavy gage aluminum, were 13.4 cm. in diameter, 6.5 cm. deep, and constructed with a flat shoulder 1.8 cm. wide. Heavy rubber rings were cut to fit the shoulders and the samples were placed between the rings and made tight by means of steel C clamps. At 15 and at 0° F., the atmospheric humidities were those existing under average commercial conditions, the exact moisture content of the air being unknown. Nonvaporproof 30-pound untreated vegetable parchment was used as a control. The study included various types of moistureproof paper, moistureproof viscose sheets, laminated rubber compound sheet, and ethylcellulose-treated paper. The measurement of the effect of increasing upon water vapor penetration was included to obtain experimental evidence concerning the effect of the wrapping procedure.

Rabak, William, and Dehority, G. L. Effects of heat sealing on water vapor permeabilities of coated cellophanes. *Modern Packaging* 17, No. 7:161-163 (March, 1944).—The water vapor permeability determinations were carried out by the TAPPI Standard but with the use of a specially designed dish similar in construction to the General Foods test dish and a testing tunnel having an air velocity of 500 feet per minute, with the air maintained at an average relative humidity of 87% and an average temperature of 89° F. The average vapor-pressure difference be-

tween the atmosphere maintained in the testing dish tunnel and the inside of the vapometer or test dish was 28 mm. of mercury. The vapometer exposed a total sample area of 21.6 sq. in. The sealing wax mixture consisted of 1 part of resin and 2 parts of Midcontinent paraffin.

Rhoads, Thomas H. Package testing in controlled atmosphere. *Modern Packaging* 18, No. 6:127-128 (Feb., 1945).—Package-testing cabinets are of three types: the first functions are a high humidity—e.g., at 100° F. and 90% relative humidity; the second functions at a low humidity—e.g., 100° F. and 35% relative humidity; the third functions at low temperatures. Some tests have been made in a dry cabinet at temperatures as high as 120° F. and 18% relative humidity. The low-humidity conditions are valuable only where it is desired to maintain a certain moisture content for the material inside the package and this moisture content is not to be decreased through losses in moisture. The most important test is at high humidity where it is desired to keep moisture from passing into the product. Certain factors are involved in the design and construction of a cabinet for controlling temperature at high humidity. The air circulation throughout the cabinet should be as nearly uniform as possible. The humidity must be so controlled that there is no condensation on the side walls or on the package. The size should be such that several packages can be tested at one time. The most important factor in the design of a cabinet is the controlling mechanism.

Rowley, Frank B., and Lund, C. E. Vapor transmission analysis of structural insulating boards. Univ. Minnesota, Institute of Technology, Eng. Expt. Sta., Bull No. 22 (Vol. 47, No. 47). Oct. 9, 1944. 71 p.—The test apparatus (for small test panels) consisted of a sealed frame with one surface covered by the test sample and the other by an aluminum condensing panel; the test specimen and the aluminum panel were separated by 2 inches with a 1¾-inch insulating pad between them. These were sealed around the edges to prevent the passage of vapor through the channels. In making a test, the sample was exposed to warm air, usually at 70° F. and 40% relative humidity, and the aluminum condensation panel was exposed to cold air at − 10° F. The insulating pad was placed between the test sample and the aluminum panel to give a greater temperature drop between the two. Under test conditions, the vapor passes from the warm moist air, through the test sample and the insulating pad, and condenses on the aluminum panel. The last is removable and may be weighed at regular intervals (usually 48 hours) to determine the rate at which the vapor passes through the test sample. For many of the thicker insulating board samples, the insulating pad was omitted. Details are given also for a method of testing full-scale walls.

Sachsenberg, E. Investigation of paper bags with regard to moisture permeability and strength. *Papier-Ztg.* 62, No. 84:1428-1429; No. 85:1444-1446 (Oct. 20, 23, 1937); *B. I. P. C.* 8:175; *T. S.* 106:337.—A testing room is illustrated (but not described) in which the temperature and relative humidity are controlled by means of an electric heating device and passage of the air over sulphuric acid. Moisture permeability is determined by means of the cup method.

Schütz, F., and Schröter, G. A. The water-vapor permeability of packaging materials. *Chem.-Ztg.* 65, No. 97/98:475-476(Dec. 10, 1941); *B. I. P. C.* 13: 202; *C. A.* 37:973.—The authors use dishes partly filled with silca gel, which are covered with pieces of the wrapping material and placed in a humidity cabinet at 20° C. The dishes are weighed after 24 hours to determine the amount of water taken up by the drying agent through the wrapping material.

Schumacher, Earle E., and Ferguson, Lawrence. A convenient apparatus for measuring the diffusion of gases and vapors through membranes. *J. Am. Chem. Soc.* 49, No. 2:427-428(Feb., 1927).—The apparatus consists of a combination of a mechanical clamp and a mercury seal. This equipment operates under a low pressure, building up a high humidity on one side of the sheet; the water vapor diffusion through the sheet into the other chamber is measured. The method should be satisfactory for scientific work but would probably not lend itself to routine testing.

Sears, G. R., Schlagenhauf, H. A., Givens, J. C., and Yett, F. R. Comparison of methods for the determination of water vapor permeability. Tests conducted at The Institute of Paper Chemistry. *Paper Trade J.* 118, No. 3:39-40 (Jan. 20, 1944); *Tech. Assoc. Papers* 27:580-581 (June, 1944).—It has been recognized that the present TAPPI Standard for the determination of water vapor permeability has its limitations in the evaluation of the more resistant materials and that the existing procedures should be compared before drafting a new method. Results are reported on the regular General Foods method, a modification of it to obtain a constant rate of gain, and The Institute of Paper Chemistry method. The samples studied were: cellophane, ethyl cellulose sheeting, greaseproof to board lamination, Pliofilm, Reynolds stock (cellophane-metal foil-kraft paper lamination), Scutan (a special laminated and coated product), three-ply glassine, waxed glassine, and a lacquer-coated label stock.

Shuman, A. Cornwell. Apparatus for measuring the gas permeability of film materials of low permeability. *Ind. Eng. Chem., Anal. Ed.* 16, No. 1:58-60 (Jan., 1944) *B. I. P. C.* 15:24.—The mechanism of gas transmission through film determines to some extent the conditions under which a film should be tested. Two factors are involved: the difference in total pressure on the two sides of the film and the difference in partial pressure of the gas being tested on the two sides of the film. In the apparatus used in this work, the test is made under the conditions of atmospheric pressure of the gas being tested on one side of the film and zero pressure of all gases on the other side. Essentially, the method involves measuring changes in pressure inside a small evacuated space produced by gas passing into that space through the film sample being tested. The apparatus is suitable for measuring a gas permeability as low as 0.001 cc. per 100 sq. in. per 24 hours. The original should be consulted for the details.

Smith, F. R., and Kleiber, Max. Apparatus for measuring rate of gas penetration through food-packaging materials. *Ind. Eng. Chem., Anal. Ed.* 16, No. 9:586-587 (Sept., 1944); *B. I. P. C.* 15:62.—The apparatus consists of a glass diffusion chamber (about 6 cm. outside diameter and 18 cm. long) to which is attached a glass receptacle containing mercury by means of bicycle inner tubing. The orifice of the chamber is closed by a glass bell or a sack of the packaging material in question. Gas is introduced and sampled through a tube, the end of which is about 8 cm. below the top of the diffusion chamber. The manipulation of the apparatus is described in detail. The absolute accuracy of the measurements is deter-

mined by the accuracy of the gas analysis. The relative accuracy can be changed by varying the time of penetration and thus the difference between start and end concentration of oxygen in the gas inside the pouch. The apparatus is particularly suitable for determining the rate of oxygen penetration into pouches used for food packaging.

Southwick, C. A. Practical aspects of water vapor permeability testing. *Tech. Assoc. Papers* 27:575-577 (June, 1944).—The author gives a general discussion of the importance of water-vapor permeability determinations. He also points out that this test is but one of several which must be considered; others include the transmission of fixed gases—oxygen, nitrogen, carbon dioxide, etc.—and the migration of organic flavors. In the final analysis, it is the package that must be considered and some indication is given of the types of tests that should be applied to containers, such as flat-fold test, surface durability or resistance to rubbing or to surface abrasion, effect of stress or elongation, etc.

Staedel, Wilhelm. Apparatus for testing the resistance toward the passage of air humidity of papers, textiles, etc. *Monatschr. Textil-Ind.* 50:146-148, 168 (1935); *Wochbl. Papierfabr.* 66, No. 12:224-228 (March 23, 1935); *C. A.* 29:6474, 7125; *T. S.* 102:10. —A photograph and a schematic diagram of the testing apparatus are given: The test material is stretched over a flat, light metal pan on which has been placed a very moist piece of felt. As the space between the test material and the felt amounts to only a few cc., the air present quickly reaches a relative air humidity of 100%. The pan is placed in a room with stationary air humidity (65%) and temperature (20° C.), while the air of the room is blown with uniform velocity over the test material. The stretched material steadily absorbs moisture from the air of 100% relative humidity and gives off the moisture in the form of steam to the air of 65% relative humidity on the other side. The evaporation pan and the test material are weighed together at the beginning and end of the test and at an intermediate point. The loss in weight corresponds to the amount of steam which passed through in the interval of time. This passage of steam is greatly influenced by temperature, air humidity, and air velocity. The steam passage of a material is defined as the weight in grams of steam which passes in 1 hour through a test surface of 1 sq. dm. at a temperature of about 20° C. and relative air humidities, on the two sides of the test material, of 100 and 65%.

Staedel, Wilhelm. The permeability of paper to water vapor. *Papier-Fabr.* 31, No. 41:535-540; No. 42:545-549 (Oct. 8, 15, 1933); *Paper Making* 54, No. 9:231-233 (Sept., 1935); *C. A.* 28:1529; *B. C. A.* 1934B:13; *T. S.* 99:104.—After reviewing previous work, the following method was developed for measuring water-vapor transmission: A 200-sq. cm. sample is clamped over a shallow aluminum pan containing a well-saturated felt; the weight loss is determined at intervals and the rate calculated. For consistent results the felt must carry sufficient water; 0.5 to 3 hours must be allowed (depending on the weight of the sheet) for the rate to reach a constant value; an air velocity of 3 ± 0.25 meter per second, a humidity constant to 2%, and a temperature constant to 0.1° C. must be maintained over the sample. A number of papers were tested. Commercial papers (including parchment and greaseproof papers) and cellophane gave values of 35 to 60, waxed paper 5, and moisture-proof cellophane 0.5. There is no relation between water permeability and air transmission. Staedel agrees with Abrams and Chilson that the vapor-pressure difference across the sheet is the driving force in vapor transmission and, further, that vapor-phase diffusion is relatively unimportant, most of the transfer being through the fiber substance at a rate specific for the nature of the fiber.

Symington, F. S., and Burroughs, R. F. The GFMVT (Southwick) test for moisture vapor transmission. *Fibre Containers* 28, No. 4:107-109 (April, 1943); *B. I. P. C.* 13:401.—The description of the apparatus is similar to that given above under the article entitled "Moisture-vapor test cabinet." The test procedure is given in detail. The test requires 5 to 6 working days, the time of the various operations being as follows: preparation of circular samples and sealing in cups 6 hours, conditioning in cabinet (12 to 24 hours) 18 hours, drying surface moisture in desiccator 4 hours, weighing samples 2 hours, test periods in cabinet 68 hours, drying surface moisture in desiccator 4 hours, weighing samples 2 hours, preparation for next test 3 hours. This covers testing eight to sixteen samples of but one or two materials. Data are given for a number of paperboards and various protective materials.

TAPPI Water vapor permeability of paper and paperboard. TAPPI Standard T 448 m-44. Aug., 1944. 1 sheet. *Paper Trade J.* 111, No. 6:25-27 (Aug. 8, 1940); 117, No. 10:30 (Sept. 2, 1943); 118, No. 5:29-31 (Feb. 3, 1944).—Water-vapor permeability is defined for this test as the weight of water transmitted per unit of time, per unit area, measured while the specimen separates a dry atmosphere in a test cell from the standard atmosphere of 50% relative humidity and 73°F. on the other face. The present method is for the determination of the water-vapor permeability of paper and paperboard under normal atmospheric conditions. It is considered generally suitable for other material up to 1 inch in thickness.

TAPPI. Water vapor permeability of sheet materials at high temperture and humidity. TAPPI Standard T 464 m-44. July, 1944. 4 p. *Paper Trade J.* 119, No. 4:29-32 (July 27, 1944).—The influence of temperature and humidity on the water-vapor transmission of most sheet materials is by no means linear, so that test results obtained at lower temperatures and humidities cannot be extrapolated, as a rule, to apply to hot, damp atmospheric conditions. The present method describes a procedure by which the water vapor permeability of a sample is measured at 100°F., with a relative humidity of about 90% on one face and below 5% on the other.

TAPPI. Creasing of paper for water vapor permeability tests. TAPPI Standard T 465 sm-44. (March, 1944). 1 p.—The purpose of this method is o provide reproducibly creased speciments for water vapor permeability testing.

TAPPI. *Committee on Paper Testing.* Water vapor permeability symposium. *Tech. Assoc. Papers* 20:90-102 (June, 1937).—The method of measuring the vapor permeability, as sponsored by Abrams and Chilson and as applied by the Thwing Instrument Company's Vapometer, has been found satisfactory for determining the vapor permeability of wrapping papers. This procedure was originally checked against a method involving the use of squares of paper pulp saturated with a desiccant. These squares are brittle when dry, but lose this property when a slight amount of moisture is added. The brittle pulp squares are sealed in envelopes of the material to be tested, and the time required for the pulp samples to lose their

brittle characteristic is noted. The practical limitations of the Vapometer test procedure are chiefly concerned with the time factor. For control purposes, where results are required in a few hours, this method is impractical for papers possessing a high degree of impermeability. Attempts to decrease the time factor by increasing the vapor-pressure difference by heat were generally unsuccessful because of condensation and pressure within the Vapometer. In order to improve the test procedure, it is recommended that the weight of the Vapometer be decreased and that its design be changed to permit the water level in the instrument to come within 0.5 inch of the test sample when 50 ml. of water are added. The use of a paraffin wax seal around the edges of the Vapometer will prevent leakage from the edge of the test sample, thereby increasing the accuracy of the test. Because of its flexibility and the ease with which it adapts itself to the testing procedure now used in the paper industry, it is felt that a vapor permeability test for papers involving the use of the Vapometer should find universal application with slight modifications to meet individual requirements.

Taylor, R. L., Herrmann, D. B., and Kemp, A. R. Diffusion of water through insulating materials. *Ind. Eng. Chem.* 28, No. 11:1255-1263 (Nov., 1936); *India Rubber World* 93, No. 1:48 (Oct. 1, 1935); *C. A.* 30:8430.—The rate of permeation was measured by sealing the material across a cup or cell in such a manner that water passes from the cell through the sample into a drying agent outside. Four types of cells were used, three of which have been described by Herrmann [*Bell Lab. Record* 13:45 (1934)]. A diffusion constant, based on Fick's linear diffusion law, was calculated for the various materials tested (rubber, synthetic resins, and other organic materials, such as cellulose acetate, benzylcellulose, etc.). The variation of the diffusion rate with time, of the diffusion constant with vapor pressure, thickness, and temperature, the concentration gradient during diffusion, the effect of water-soluble constituents, and the mechanism of water diffusion were studied. The rate of diffusion through a water-sorbing material, such as rubber, does not obey Fick's law when the diffusion conditions favor high water sorption.

Thwing Instrument Co. The Vapometer. *Instruments* 7:146 (July, 1934).—The Vapometer is an apparatus for the determination of the moistureproofness of paper, etc. An aluminum body is partially filled with water, and the test sample is clamped between the stationary rim and the loose rim. The instrument is weighed and set before an electric fan at a distance which will give an air velocity of 600 to 700 feet per minute. At any time after a 6-hour exposure, and at other time intervals, the Vapometer is again weighed. The results are expressed as "water vapor transmission rate" in "grams per 100 sq. in. per 24 hours." The Vapometer is designed to fit on an analytical balance to make weighings convenient.

Thomas, Charles A., and Reboulet, Herman J. Moistureproof determination of waxed papers. *Ind. Eng. Chem., Anal. Ed.* 2, No. 4; 390-391 (Oct. 15, 1930); *C. A.* 24:5487; *T. S.* 92:158; *B. C. A.* 1931B:15.—The samples to be tested are clamped between two brass flanges. The area of the paper exposed for the test is 6 sq. in. Air which is saturated with water vapor is brought under slight pressure (0.2 inch or 5 mm.) against the sample and the moisture passing through during a period of 2 hours at 30° C. is absorbed in a calcium chloride tube and weighed. Waxed papers containing pinholes show a marked variation in amount of moisture passing through. Unless the sample is very heavily creased, the decrease in the moisture resistance is very small. The presence of pinholes in the original paper has a much greater effect on the moisture resistance than the handling and creasing of the paper as done in practice.

Tocco, Giulio, and Cerbaro, Emilio. The permeability of transparent papers to water and water vapor. *Boll. reparto fibre tessili vegetali staz. sper. ind. carta e fibre tessili vegetali* 5:166-170 (1933); *C. A.* 28:2899.—An aluminum cylindrical box of 10 sq. cm. section, containing water, is closed at the top with the paper and placed at a definite temperature in a space containing a dehydrating agent. Loss of water gives the permeability to moisture or, if the box is inverted, the permeability to water. Data are given for several types of papers and films.

Todd, H. Russell. Apparatus for measuring gas transmission through sheets and films. *Paper Trade J.* 118, No. 10:32-35 (March 9, 1944); *Tech. Assoc. Papers* 27:638-641 (June, 1944); *B. I. P. C.* 14:249.—The apparatus provides a chamber having a volume of about 10 cc. on one side of the material and one of 500 cc. on the other side. The larger chamber is evacuated and the smaller chamber is maintained at atmospheric pressure. This differential in gas pressure in the two chambers results in the movement of gas through the sheet being tested; consequently, the column of liquid in the horizontal tube moves in to displace the gas transmitted from the small chamber. The column of gas transmitted is thus measured directly A complete description is given of the apparatus and of the procedure for making the test. The time for making a test varies from a few seconds to 26 hours, depending on the permeability rate. Test results are given for ethylcellulose, regenerated cellulose, cellulose acetate, vinylidene chloride, polyvinyl alcohol, and a 30-pound glassine. Data are given also to show the effect of temperature, humidity, and sheet thickness on transmission of air through an ethylcellulose film.

Todd, H. Russell. Gas transmission measured by volumetric method. *Modern Packaging* 18, No. 4:124-126, 160 (Dec., 1944).—The apparatus and method are the same as that described in the preceding abstract.

Tressler, Donald K., and Evers, Clifford F. The technique of determining moisture vapor transmission through papers and boards. *Paper Trade J.* 101, No. 10:33-35 (Sept 5, 1935); *C. A.* 29:7656; *T. S.* 103:27.—Certain refinements are considered which have been found to increase greatly the accuracy of tests previously used to determine moisture vapor transmission through papers and boards. These modifications include the careful control of the humidity of the test chamber, the bringing of the papers to be tested to equilibrium with the atmosphere of the test chamber, the starting of the test period 48 hours after the apparatus is placed in the chamber, the extension of the test period to 5 days, and the determination of the rate of moisture vapor transmission not only at 21.2° C. but also at a temperature below 0° C. Data are presented for the rate of moisture vapor transmission of some moistureproof transparent papers and boards. The apparatus is illustrated and the method is described in detail.

Trillat, J. J., and Matricon, M. Permeability of films of cellophane to dry or moist air. *J. chim. phys.* 32:101-115 (1935); *C. A.* 29:5262.—The MacLeod gage can be used to measure the quantity of dry air passing through cellophane, either when the air in

contact with one of the forces is dry or when it is saturated. The measurements cannot be made instantaneously. The method can be used to compare ordinary and so-called "moistureproof" cellophane. A procedure using an ionization gauze gives a direct and instantaneous reading of the amount of water which passes through the film in centimeters per second. After calibration, the latter method gives an instantaneous measure of the porosity referred to different gases. On the other hand, it does not give a precise measure of quantity of air which passes through at the same time as the water vapor because of absorption of water on the walls and electrodes of the apparatus. The quantity of water vapor which passes through a film of 0.02 mm. thick was found to be 7.3×10^6 g. per sq. cm. per sec.

Weber, C. G. Water vapor permeability test. *TAPPI Bulletin* No. 22 (Nov. 30, 1943); *Paper Trade J.* 118, No. 3:36-38 (Jan. 20, 1944); *Tech. Assoc. Papers* 27:582-584 (June, 1944).—This paper is an abstract of work carried out at the National Bureau of Standards on the water vapor permeability test. The samples studied were the same as used by Sears, *et al.* A modification of the General Foods method involved the elimination of the desiccation step. Stability during weighing was secured by the use of aluminum covers, which were placed on the dishes immediately after removing them from the cabinet. Tests thus far indicate that the General Foods cabinet can be used for testing at high humidity and temperature with fairly satisfactory results if the above modifications are used.

Weedon, D. R., Jr. Packaging materials required for preservation. *Paper Trade J.* 117, No. 20:29-32 (Nov. 11, 1943).—Mention is made of a creasing test for use on flexible materials when testing for moisture vapor transmission. It probably will be as follows: A 6-inch square sample will be folded with 4 equidistant parallel creases placed in the square by alternating the direction of folding on each successive one so that the sheet is folded in accordian style. This stack will then be placed between two rigid flat plates and a weight of 36 pounds applied for 1 minute. The sheet will then be opened and the creasing under the weight process repeated, making the second series of 4 folds perpendicular to the original folds. A circular sample will then be cut from the center of this creased square for testing.

Mention is made also of a method for testing pressure sensitive tape for water vapor transmission. It is a modification of the General Foods test, in which the tape is applied over a slot in a thin metal disk, which is, in turn, sealed with wax in the cup normally used in container material testing. The slot which is being used is 1.5 by 3.5 inches and the tape sample is 2 by 4 inches.

Wilson, John A., and Lines, George O. The ventilating properties of leather. *Ind. Eng. Chem.* 17, No. 6:570-573 (June, 1925).—Sulphuric acid is used as the desiccant. The leather sample is placed between two brass disks, 1.267 sq. cm. of leather being exposed to the water vapor. The assembled cap (containing the disks and leather) and bottle is placed in a desiccator containing water; thus the leather is between an atmosphere of approximately 0% relative humidity and one of 100% relative humidity. The results are reported as milligrams of water passing through the material in 24 hours.

Wray, Robert I., and Van Vorst, A. R. Permeability of paint films to moisture. *Ind. Eng. Chem.* 25, No. 8:842-846 (Aug., 1933).—Paint films were sealed with a special wax composition to the tops of shallow Petri dishes partially filled with activated alumina. The dishes were weighed and placed in a humidity cabinet automatically maintained at 95% humidity at 27° C. The vessels were reweighed at intervals of 48 hours. The permeability is expressed as milligrams of moisture diffusing through 1 sq. cm. of film per hour. A method is given also for the permeability of paint films on panels.

New TAPPI Members

Carl J. Bergendahl, Superintendent, Inlands Aktiebolag, Lilla Edet, Sweden. Attended Chalmers Tekm Hogskola, Goteburg, Sweden. He is now in the Department of Pulp & Paper Manufacture, New York State College of Forestry, Syracuse, New York.

C. C. Chang, student, University of Maine, Department of Chemical Engineering. On leave of absence from Central Paper Mill, Chungking, China. He is a 1936 graduate of National Peking University.

Thomas G. Cunane, Paper Mill Manager, St. Cuthberts Paper Works, Ltd., Wells, Somerset, England, a 1936 graduate of Corpus Christi College, Cambridge, England.

Ralph S. Eiff, Technical Superintendent, Kimberly-Clark Corp., Neenah, Wisconsin, a 1930 graduate of Marquette University.

Donald H. Maunsell, Production Superintendent, Dryden Paper Co. Ltd., Dryden, Ont., Canada.

Marshall W. Ramsey, Senior Inspector of Textiles, Philadelphia QM Depot, U. S. War Department, 2800 South 20th St., Philadelphia, Pennsylvania, a 1932 graduate of Philadelphia Textile Institute.

Philip Sadtler, Vice-President, Samuel P. Sadtler & Son, Inc., 210 South 13th St., Philadelphia, Pennsylvania, a 1934 graduate of Lehigh University.

Oscar M. Stanley, Industrial Chemist, Australian Sisalkraft Co. Pty. Ltd., Sydney, N.S.W., Australia, a 1919 graduate of Upper Industrial School, Budapest.

Kingdon R. Watt, Jr., Technical Director, Curtis Paper Company, Newark, Delaware, a 1937 graduate of Northeastern University.

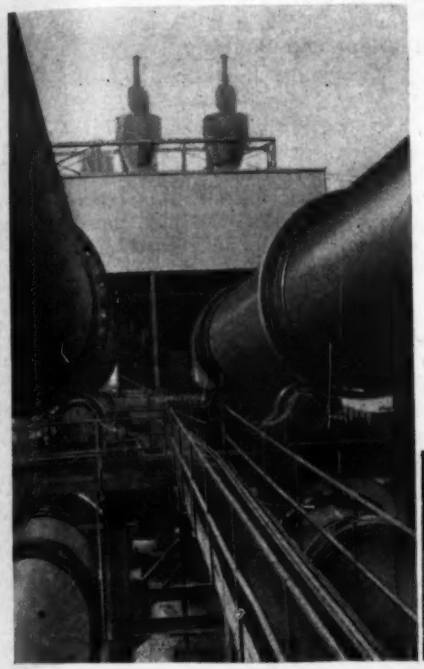
Scientific Instruments

The Interscience Publishers have recently issued a book entitled "Major Instruments and Their Applications to Chemistry," edited by R. E. Burke of E. I. du Pont de Nemours and Oliver Grummit Western Reserve University (151 pp. 6x9).

This book is limited in coverage to optical instruments which are used to solve problems of chemical structure and analysis. Each section is covered by a different author. Electron Diffraction and the Examination of Surfaces is covered by L. H. Germer of the Bell Telephone Laboratories, New York, N. Y. The Electron Microscope and Its Applications, by L. Marton of Stanford University, California, X-Ray Diffraction, by Maurice L. Huggins, Eastman Kodak Company, Rochester, N. Y., Chemical Spectroscopy and The Application of Absorption Spectra to Chemical Problems by Wallace R. Brode, Ohio State University, Columbus, Ohio, and Infrared Spectrometer and Its Application by R. Bowling Barnes, American Cyanamid Company, Stamford, Conn.

Copies may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd Street, New York 17, N. Y., at $3.50 per copy.

PAPER MILL OPERATORS



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New York Paper and Pulp Market Review

Paper Output High But Well Below Demand—Current System of Pricing Wood Pulp To Be Continued—Mill Buying of New and Old Cotton Rags Steady — Waste Paper Is Heavy In All Grades.

Office of the PAPER TRADE JOURNAL,
Wednesday, October 17, 1945.

All-over demand for paper and allied products continues high. Production is current over 97% of capacity and supply is widely reported far below the backlog of orders. The continued declining coal supply is menacing future operations of some mills. Of great current concern is the problem of establishing an equitable price adjustment by the OPA. In general, conditions are somewhat slowly returning to a more normal state of activity. There appears to be a substantial weight of opinion that conversion would be accelerated by removing more Government controls.

The index of general business activity for the week ended October 6 declined to 116.7, from 119.5 in the previous week, compared with 135.5 for the corresponding week in 1944. The index of paperboard production was 139.7, compared with 147.2 in the previous week, and with 144.1 for the corresponding week in 1944.

Paper production for the week ended October 6 was estimated at 97.6%, compared with 93.4% for 1944, with 90.9% for 1943, with 88.0% for 1942, and with 102.1% for the corresponding week in 1941.

Paperboard production for the week ended October 6 was 93.0%, compared with 96.0% for 1944, with 94.0% for 1943, with 80.0% for 1942, and with 99.0% for the corresponding week in 1941.

Wood Pulp

The present system of establishing producers' prices for wood pulp should be continued, in the opinion of the Advisory Committee meeting with OPA and a representative group of domestic and foreign buyers of wood pulp. Both producers and buyers agreed that any modification now in the present pricing system would be detrimental to an orderly transition to peacetime operations in the industry. It was recommended that the current subsidy program be continued during the coming months of the reconversion period. At the direction of the Office of War Mobilization and Reconversion, the Reconstruction Finance Corporation is paying subsidies to domestic producers of high cost market wood pulp. The subsidy program is designed to insure the maintenance of essential supplies of wood pulp and to assist in the stabilization of prices in the pulp and paper industry, the OPA stated.

Rags

New cotton cuttings continue in active demand. Mill buying is steady and absorbing a relatively heavy tonnage. New white shirt cuttings and the unbleached grade are in largest demand, but colored cuttings are in good demand at this date. Prices are firm at ceiling levels.

The roofing grades of old cotton rags continue to most active. Demand for the products of felting mills is substantially above current supplies in dealers' hands, current reports indicate, and the market for old cotton rags is expected to be firmly maintained for many months. Prices are firm in all grades.

Old Rope and Bagging

Strong demand for Manila rope continues to be maintained by the limited supply. Supply of sisal, jute and other fibers is reported adequate, with demand moderate and prices less firm at this date.

No important change in the old bagging market has been reported this week. Trading is reported fair in most quarters, with no substantial improvement expected until the automobile industry enters the market in volume. Prices are unchanged.

Waste Paper

Dealers in waste paper, the OPA announces, may include specified grades with shipments of old corrugated containers and No. 1 heavy books and magazines, and still stell at ceiling prices for these two grades. This action, effective October 17, 1945, is taken at the request of both sellers and buyers.

Mill demand for paper stock is active, with prices in all grades at ceiling levels. Supply of the news grades is still well under demand.

Pacific Mills Promotes Two

VANCOUVER, B. C., October 12, 1945—Two new appointments have now been announced by Pacific Mills Ltd. P. A. Frattinger, B. Comm, B.Sc., has been appointed plant engineer at the company's plant at Ocean Falls, British Columbia.

Graduate of the University of British Columbia, Mr. Frattinger was in charge of material inspection in New York for the British Purchasing Commission during 1940-42, and after engineering assignments to both the United States and Canadian war plants, served with Howard Smith Paper Mills as plant engineer.

Mr. Parr specialized in methods and work simplification at the University of Toronto, and after service with Sangamo Company of Toronto, joined the Vancouver plant of Boeing Aircraft of Canada Limited as industrial engineer.

OPA Changes Envelope Ceiling Base

WASHINGTON, D. C., October 15, 1945—Manufacturers will determine their ceiling prices for envelopes by taking their highest prices in effect from October 1 to December 15, 1941, instead of their highest prices from October 1 to 15, 1941, the Office of Price Administration announced this week. This extension of the base period, effective October 17, 1945, will result in slightly higher prices for a minority of companies in the industry which were not able to complete before mid-December the establishment of their price schedules at the levels set by the majority of companies within the original base period of October 1 to 15, 1941.

Any increases occurring at the manufacturing level will not be passed on by subsequent sellers. Consequently, price ceilings for envelopes at the wholesale or retail levels are not changed.

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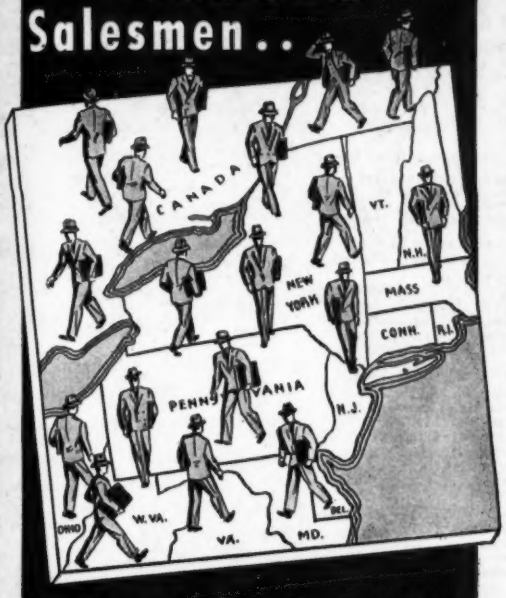

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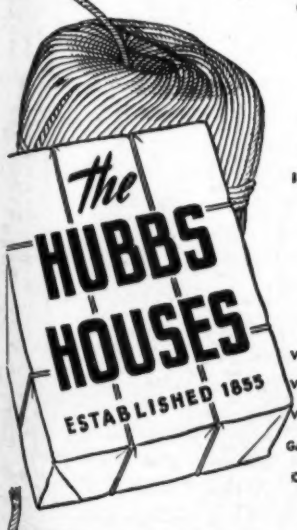

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TRI-UMPH all cotton, 3 ply 53 oz., widths up to 250".

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MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL,
Wednesday, October 17, 1945.

BLANC FIXE—Prices on blanc fixe continue unchanged at prevailing levels. Demand is reported fair. The pulp is quoted at $40 per ton, in barrels, at works. The powder is quoted at $60 per ton, f.o.b. works.

BLEACHING POWDER.—All-over demand continues heavy. Production reported high. Quotations are unchanged. Bleaching powder is currently quoted at from $2.50 to $3.10 per 100 pounds. All prices in drums, car lots, f.o.b. works.

CASEIN—OPA maximum prices on processed acid-precipitated casein are as follows: 10,000 pounds or more 24 cents per pound; 2,000 pounds, 24½ cents per pound, less than 2,000 pounds, 24¾ cents per pound f.o.b. shipping point. Imported 21 to 23 cents.

CAUSTIC SODA—Demand heavy. Production large. Market tight. Shipments of solid and flake delayed by lack of manpower. Solid caustic soda is currently quoted at $2.30 per 100 pounds. The flake and ground are currently quoted at $2.70 per 100 pounds. All prices in drums, car lots, f.o.b. works.

CHINA CLAY—Current demand is reported moderate on many grades of china clay. Quotations unchanged. Domestic filler clay is quoted at from $7.50 to $15 per ton; coating clay is quoted at from $12 to $22 per ton, at mines. Imported china clay is currently quoted at from $13 to $25 per long ton, shipside.

CHLORINE—All essential requirements met. Output continues high. Chlorine is currently quoted at $1.75 per 100 pounds, in single unit tank cars, f.o.b. works.

ROSIN—Offerings and sales light. The OPA price on "G" gum rosin is $6.74 per 100 pounds in barrels, at Savannah. "FF" rosin is established quoted at $6.70 per 100 pounds, in barrels at New York. Average price on seventy per cent gum rosin size in $6.95 per 100 pounds, f.o.b. works.

SALT CAKE—Prices on salt cake continue to be reported unchanged. Domestic salt cake is currently quoted at $15 per ton, in bulk. Chrome cake is currently quoted at $16 per ton. All quoted prices in car lots, f.o.b. shipping point.

SODA ASH—Heavy demand for soda ash is reported to absorb current production. Market rather tight. Prices continue to conform to prevailing levels. Quotations on soda ash in car lots, per 100 pounds, are as follows; in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Corn supply smaller, involving possible estimated frost damage with future prospects favorable. Offerings moderate at this date. Demand heavy. Prices unchanged on starch. Pearl is quoted at $3.72 per 100 pounds. Powdered starch is quoted at $3.83 per 100 pounds. All prices in bags, car lots, f.o.b. Chicago.

SULPHATE OF ALUMINA—Demand good. Supply situation is favorable. Prices of the commercial grades are currently quoted at from $1.15 to $1.25 per 100 pounds. The iron free is currently quoted at $1.75 per 100 pounds. All prices in bags, car lots, f.o.b. works.

SULPHUR—Current consumption of sulphur continues heavy. Market situation unchanged. The quotation on annual contracts continues at $16 per long ton, f.o.b. mines. The current price on contracts at Gulf Ports is $17.50 per long ton.

TALC—Demand reported moderate. Domestic grades are currently quoted at from $16 to $21 per ton at mines. Canadian at $24 per ton. All prices in car lots.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

Standard News, per ton—			
Roll, contract	*$61.00	@	—
Sheets	69.00	@	—
* OPA Maximum Price.			
Kraft—per cwt.—Carload Quantities Zone A, Delivered			
Superstandard Wrapping	*$5.25	@	—
No. 1 Wrapping	*5.00	"	—
Standard Wrapping	*4.75	"	—
Standard Bag	*4.375	"	—
* OPA Manufacturers' Prices.			
Tissues—Per Ream—Carlots			
White No. 1	1.12½	"	—
White No. 1 M. G.	1.10	"	—
White No. 1½	1.00	"	—
White No. 2	.90	"	—
Anti-Tarnish M.F.	1.20	"	—
Colored	—	"	—
Kraft	.95	"	—
Manila	.90	"	—
Toilet—1 M. Sheets—Per Case			
Unbleached	4.25	"	—
Bleached	5.70	"	—
Unbl. Toilet, 1 M.	4.16	"	—
Bleached Toilet	5.70	"	—
Paper Towels, Per Case—			
Unbleached, Jr.	2.20	"	—
Bleached, Jr.	3.20	"	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	11.25	@	—
No. 1 Manila Wrapping, 35 lb.	6.00	"	6.25
Boards, per ton—			
News	*50.00	@	—
Chip	*50.00	"	—
Sgl. Mla. Lt. Chip	*62.00	"	—
White Pat. Coated	*75.00	"	—
Kraft Liners 50 lb.	*63.00	"	—
Binders Boards	84.00	"	116.00

* OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5.; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
100% Rag Ext. No. 1	$39.10 @	$46.00	$40.25 @	$47.25
100% Rag	32.20 "	37.75	33.35 "	39.25
85% Rag	.... "	....	29.90 "	35.00
75% Rag	23.00 "	27.00	24.15 "	28.25
65% Rag	.... "	....	22.80 "	27.75
50% Rag	18.70 "	22.75	19.90 "	24.25
25% Rag	16.40 "	20.00	17.55 "	21.50

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
No. 1	$10.55 @	$12.75	$11.70 @	$14.25
No. 2	9.65 "	11.75	10.80 "	13.25
No. 3	9.20 "	11.25	10.35 "	12.50
No. 4	8.90 "	10.75	10.05 "	12.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper. Delivered in Zone 1:

No. 1 Glossy Coated	$13.65 @		$15.1
No. 2 Glossy Coated	12.40 "		14.0
No. 3 Glossy Coated	11.60 "		13.2
No. 4 Glossy Coated	11.15 "		12.7
No. 1 Antique (watermarked)	10.25 "		11.7
No. 2 Offset	9.60 "		11.0
A Grade E. F.	9.35 "		10.7
A Grade S. & S. C.	9.60 "		11.0
B Grade E. F.	8.85 "		10.1
B Grade S. C.	9.10 "		10.4
C Grade E. F.	8.55 "		9.7
C Grade S. C.	8.80 "		10.0
D Grade E. F.	8.25 "		9.5
D Grade S. & S. C.	8.50 "		9.7

Ivory & India at $.50 cwt. extra.

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers Prices, Less Freight Not Exceeding OPA Allowances

Bl. Softwood Sulphite	$86.0
Unbl. Softwood Sulphite	74.0
Bl. Hardwood Sulphite	83.0
Unbl. Hardwood Sulphite	71.5
Bl. Mitscherlich	81.0
Unbl. Mitscherlich 72.00 @	82.0
N. Bleached Sulphate	86.0
S. Bleached Sulphate	79.0
N. Semi-Bleached Sulphate	82.0
S. Semi Bleached Sulphate	75.0
N. Unbl. Sulphate	73.0
S. Unbl. Sulphate	63.0
Bl. Soda	76.0
Unbl. Soda	72.0
Groundwood	58.0

Transportation Allowances

Applying to Producers of Wet West Pulp.

	Below 50% Air Dry Weight
Northeast	$13.50
Lake Central	13.50
Southern	16.00
West Coast (in area)	10.50
West Coast (out area)	16.50

	50%-80% Air Dry Weight
Northeast	11.50
Lake Central	11.50
Southern	14.00
West Coast (in area)	9.50
West Coast (out area)	15.50

Applying to Producers of Dry West Pulp.

	Above 80% Air Dry Weight
Northeast	$8.50
Lake Central	8.50
Southern	11.00
West Coast (in area)	7.50
West Coast (out area)	13.50

Should freight charges actually exceed these allowances, the difference may be added to the maximum prices.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

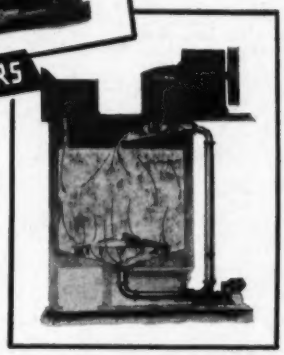
Shirt Cuttings—			
New White, No. 1	6.50	@	7.25
Silesias No. 1	—	"	5.75
New Unbleached	6.75	"	7.50
Blue Overall	—	"	5.50
Fancy	—	"	3.50
Washables	—	"	3.00
Bleached Khaki Cuttings	—	"	4.25
Unbleached Khaki Cuttings	—	"	2.50

*OPA Maximum Prices

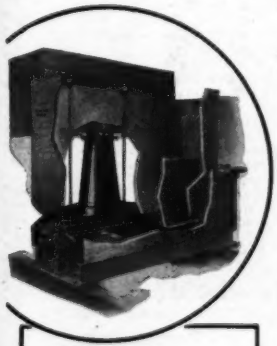
HERE'S NEW

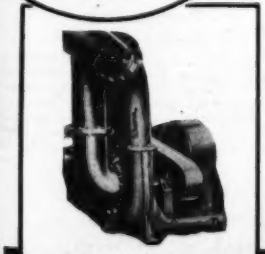
MURRAY EQUIPMENT FOR YOUR MILL

PULP STOCK AGITATORS



Here are three of the most recent developments in equipment to aid operating conditions — complete details upon request. Murray Pulp Stock Agitators for a thorough and complete agitation of pulp stock in chests, an improved circulating system of pulp stock agitation that produces a uniform consistency . . . will efficiently agitate stock in any size or shape of chest . . . exclusive features patented in the U. S. and Canada. Illustrated are agitator in horizontal and vertical chests. Furnished complete, ready for installation and design to fit any existing chest.





AND OTHER PAPERMILL AND WOODROOM EQUIPMENT

- ★ Multiple Knife discs
- ★ Pulp wood slashers
- ★ Flat screens
- ★ Pulp wood chippers
- ★ Roll heading machines
- ★ Windershafts
- ★ Blast sections
- ★ Chip crushers
- ★ Knot saws
- ★ Unit Heaters
- ★ Knot drills
- ★ Wood cleaners

New flow spreader for Fourdrinier paper machines, and new fan pump for handling diluted stock going into paper machine screens. Complete details upon request.

D. J. MURRAY MANUFACTURING CO.

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Yes— APPLETON FELTS are truly AMERICAN

It's an American job producing Appleton Felts. They're made by Americans for American paper mills use — today the standard in quality, uniformity and dependability.

APPLETON WOOLEN MILLS - APPLETON, WIS.

Old Rags

White, No. 1—			
Repacked	*3.80	"	—
Miscellaneous	*3.20	"	—
White, No. 2—			
Repacked	*2.90	"	—
Miscellaneous	*2.65	"	—
Thirds and Blues—			
Repacked	*2.20	"	—
Miscellaneous	*1.30	"	—
Roofing Rags—			
No. 1	*1.55	"	—
No. 2	*1.45	"	—
No. 3 (bagging)	*1.35	"	—
No. 4	*1.35	"	—
No. 5A	*1.35	"	—
Old Manila Rope	5.75	"	—

* OPA Maximum Prices.

Foreign Rags

Pre-War Quotations
All Prices Nominal

New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.50	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxfords	4.00	"	4.50
New Light Prints	3.00	"	3.25

Old Rags

No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—
No. 4 White Linens	2.25	"	3.25
No. 1 White Cotton	4.25	"	4.75
No. 2 White Cotton	3.25	"	3.75
No. 3 White Cotton	2.50	"	3.00
No. 4 White Cotton	1.90	"	2.20
Extra Light Prints	2.00	"	2.40
Ord. Light Prints	1.75	"	2.15
Med. Light Prints	1.55	"	1.95
Dutch Blue Cottons	2.25	"	2.50
French Blue Linens	3.00	"	—
Checks and Blues	2.00	"	—
Linsey Garments	1.90	"	2.00
Dark Cottons	1.50	"	1.60
Old Shopperies	1.30	"	1.45
New Shopperies	1.45	"	1.50
French Blues	2.25	"	2.50

BAGGING

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.25	@	3.30
Wool Tares, light	3.25	"	3.50
Wool Tares, heavy	3.50	"	3.75
Bright Bagging	3.25	"	3.50
Manila Rope—			
Foreign	—	"	—
Domestic	*5.75	"	—
Jute Threads	5.50	"	—
No. 1 Sisal Strings	*4.00	"	—
Mixed Strings	2.00	"	—

* OPA Maximum Prices.

Old Waste Papers

(F. o. b. New York)
OPA Maximum Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Envelope Cuts	3.12½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, one cut	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Mixed Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
Mixed Groundwood Colored Shavings	.90	"	—
Overissue Magazines	1.67½	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
Mixed Books	1.10	"	—
No. 1 White Ledger	2.30	"	—
No. 2 Mixed Ledger, colored	2.00	"	—
New Manila Envelope Cuttings, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
Extra Manilas	1.95	"	—
Mixed Kraft, Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
Triple Sorted, No. 1 Brown Soft Kraft	2.50	"	—
New 100% Kraft Corrugated Cuttings	2.25	"	—
No. 1 Assorted Old Kraft	1.75	"	—
New Jute Corrugated Cuttings	.90	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.40	"	—
Box Board Cuttings	.72½	"	—
White Blank News	1.65	"	—
Overissue News	1.10	"	—
No. 1 News	1.00	"	—
No. 1 Mixed Paper	.95	"	—
Old Corrugated Containers	.82½	"	—
Mill Wrappers	1.10	"	—

Twines

All Prices Nominal
(F. o. b. Mill)
(Soft Fiber)

Coarse Polished—			
India	.21	@	—
White Hemp	.21	"	—
Fine Polished—			
Fine India	.26	"	—
Unpolished—			
Box	.17½	"	—
Paper Makers	.17	"	—
Tube Rope	.19	"	—
Wall Paper	.20½	"	—
Wrapping	.23	"	—
Soft Fiber Rope	.19	"	—
Cotton	.25	"	—
(Hard Fiber)			
Medium Java	.18	"	—
Mex. Sisal	.16	"	—
Manila	—	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill)

Shirt Cuttings—	
New White No. 1	.07¼
New White No. 2	.05¾
Light Silesias	.05¾
Black Silesias, soft	.03½
New Unbleached	.07½
Washable Prints	.04¾
Washable No. 1	.03
Blue Overall	.05½
Cottons—According to grades—	
Washable Shredding	.01¾
Fancy Percales	.04¾
New Black Soft	.03¾
Khaki Cuttings—	
Unbleachable Cotton Cuttings	.03½
Bleachable Cotton Cuttings	.04¼
Men's Corduroy	.03½
Ladies' Corduroy	.03
Cottonades	.03¾

Domestic Rags (Old)

White No. 1—Repacked	3.80	@	—
Miscellaneous No. 1	3.20	"	—
Miscellaneous No. 2	2.65	"	—
White No. 2—Repacked	2.90	"	—
Thirds and Blues—			
Miscellaneous	1.80	"	—
Repacked	2.20	"	—
Black Stockings—			
(Export)	Nominal		
Roofing Stock—			
Foreign No. 1	Nominal		
Domestic No. 1	1.55	"	—
Domestic No. 2	1.45	"	—
Roofing Bagging	1.35	"	—
Old Manila Rope	5.75	"	—

Bagging

(F. o. b. Phila.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.00	@	3.50
No. 1 Clean bright—			
Sisal Strings	.04	"	—
No. 2 Clean bright—			
Sisal Strings	.03	"	—
Sisal Jute	.02½	"	.02¾
Scrap—			
No. 1	3.25	"	3.50
No. 2	1.75	"	1.80
Wool Tares, heavy	4.00	"	4.25
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	3.75	"	4.00

Old Papers

(F. o. b. Phila.)
OPA Maximum Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	3.37½	"	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
Soft White Shavings, one cut	2.50	"	—
White Blank News	1.65	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 White Ledger	2.30	"	—
No. 2 Ledger, colored	2.00	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
Overissue Magazines	1.67½	"	—
New Manila Envelope Cuttings	2.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.95	"	—
Box Board Cuttings	.72½	"	—
Kraft Corrugated Cuttings	2.25	"	—
Old Corrugated Containers	1.40	"	—
Overissue News	1.00	"	—
No. 1 News	1.00	"	—

BOSTON

Old Papers

(F. o. b. Boston)
OPA Maximum Prices, Baled

No. 1 Hard White Shavings, unruled	2.87½	@	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	2.50	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White and Colored Tabulating Cards	2.25	"	—
Ground Wood Tabulating Cards	1.35	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.95	"	—
Overissue News	1.10	"	—
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.40	"	—
Jute Corrugated Cuttings	1.07½	"	—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	2.75	@	2.90
Sisal Rope No. 1	*4.75	"	—
Sisal Rope No. 2	* —	"	4.00
Mixed Rope	—	"	1.55
Transmission Rope—			
Foreign	(nominal)		
Domestic	2.75	"	3.00
Manila Rope—			
Foreign	(nominal)		
Domestic	5.75	"	—
Soft Jute Rope	4.50	"	5.00
Jute Carpet Threads	3.00	"	3.50
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	3.00	"	3.25
South American	—	"	3.25
Wool Tares—			
Foreign	(nominal)		
Domestic	4.25	"	—
Aust. Wool Pouches	—	"	3.65
New Zealand Wool Pouches	—	"	3.50
New Burlap Cuttings	4.75	"	5.00
Heavy Baling Bagging	4.00	"	4.25
Paper Mill Bagging	2.50	"	3.00
No. 2 Roofing Bagging	1.35	"	—

* OPA Maximum Prices.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.04½	@	.04¾
Fancy Percales	.04¼	"	.05
New White No. 1	.06¾	"	.07
New Light Flannelettes	.05½	"	.06
Canton Flannels, Bleached	.06	"	.06¼
Underwear Cutters, Bleached	.06¾	"	.06¾
Underwear Cutters, Unbleached	.05¾	"	.06
Silesias No. 1	.06	"	.06¼
New Black Silesias	.03	"	.03¼
Red Cotton Cuttings	.03½	"	.04
Soft Unbleached	.06½	"	.06¾
Blue Cheviots	.05½	"	.06
Fancy	.02¾	"	—
Washable	.02¼	"	—
Khaki Cuttings	.02¾	"	.03
O. D. Khaki	.03½	"	.03¾
Corduroy	.03¼	"	.03¾
New Canvas	.06¼	"	.06½
B. V. D. Cuttings	.06¼	"	.06½

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.80	@	—*
Miscellaneous	3.20	"	—*
White No. 2—			
Miscellaneous	2.65	"	—*
Twos and Blues, Repacked	2.20	"	—*
Old Blue Overalls	2.25	"	2.50
Thirds and Blues, Repacked	2.20	"	—*
Miscellaneous	1.80	"	—*
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	1.55	"	—*
No. 2	1.45	"	—*
No. 3	1.35	"	—*
No. 4	1.35	"	—*
No. 5, Quality A	1.35	"	—*
Quality B	1.20	"	—*
Quality C	.95	"	—*
Old Manila Rope	5.75	"	—*

* OPA Maximum Prices.

Foreign Rags

(F. o. b. Boston)

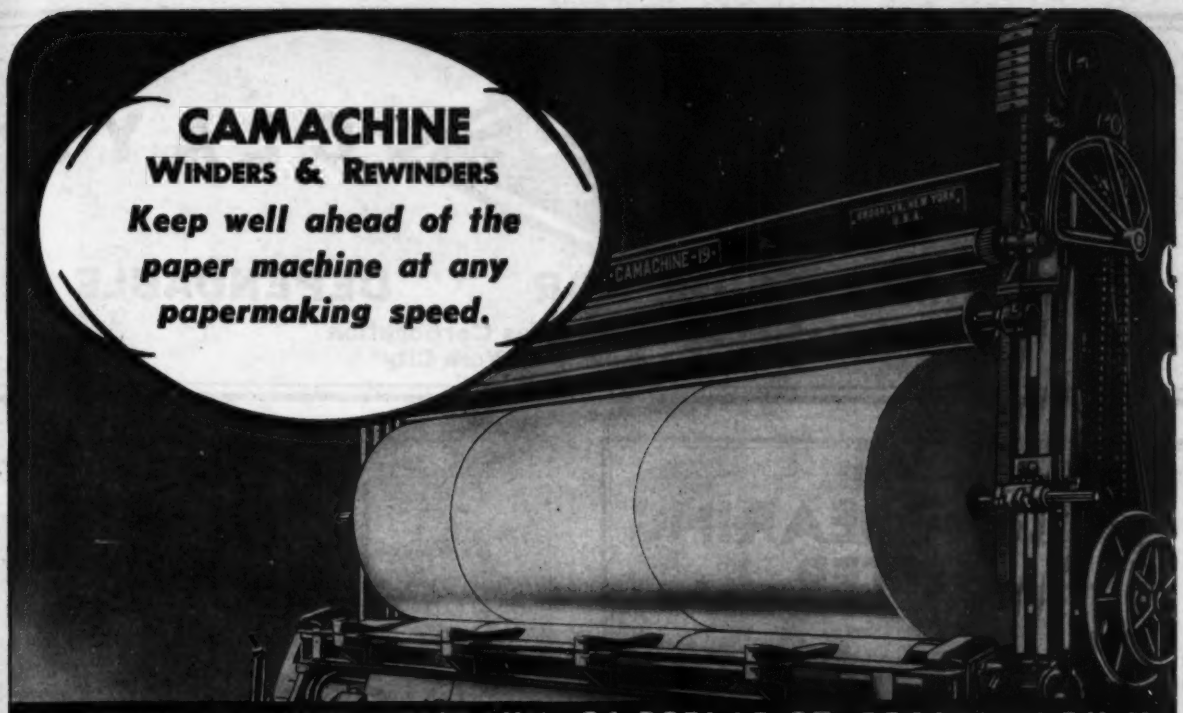
Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)
OPA Maximum Prices, Baled

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	3.37½	@	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
No. 1 White Ledger	2.30	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
White Blank News	1.65	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
No. 1 Assorted Old Kraft	1.75	"	—
Overissue News	1.10	"	—
No. 1 News	1.00	"	—
No. 1 Mixed Paper	.95	"	—
No. 1 Roofing Rags	1.55	"	—
No. 1 Roofing Bags	1.45	"	—



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(Associated with Union Screen Plate Company)

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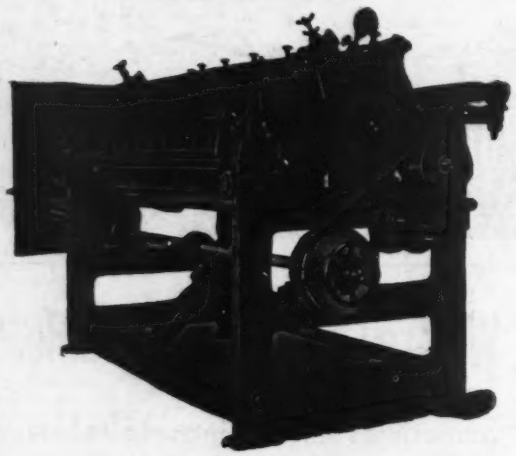
MODEL 28

ROLLER BEARING CUTTER



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LAWRENCE, MASS.

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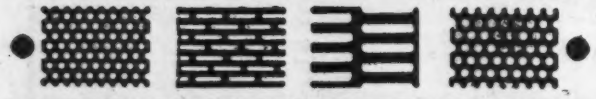

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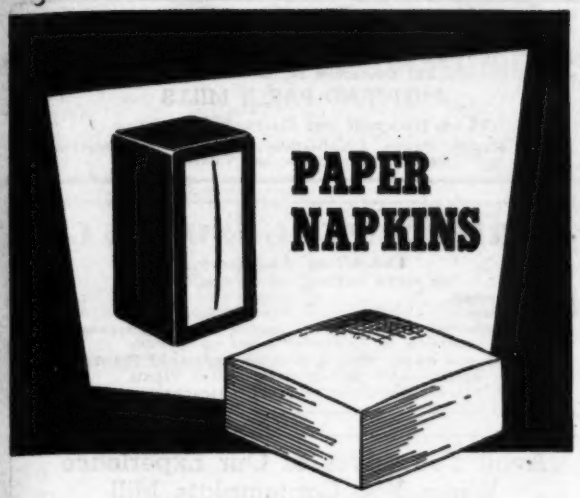
Paper Bag Machines, Aniline & Oil-Ink Presses, Waxing, Gluing, Varnishing, Laminating Machines.

POTDEVIN MACHINE CO.
EST. 1893
1223 38TH ST BROOKLYN, N. Y.

POTDEVIN



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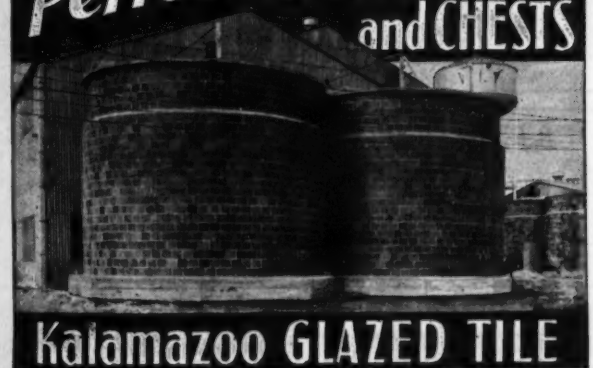

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Any Size or Shape—

Kalamazoo Glazed Tile is available in various sizes suitable for lining round or square tanks, half-round or tapered bottoms, or rounded corners. As flexible as poured concrete, being easily fitted to any space or production layout.

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BLEACHED AND UNBLEACHED SULPHITE, KRAFT PULP AND GROUND WOOD

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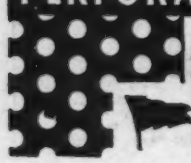

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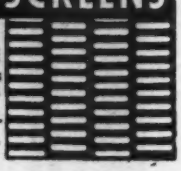

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For the Paper Manufacturer
Produced By
AMERICAN COLLOID COMPANY
363 W. Superior St. — Chicago, Ill.

K-121-B — DEINKING — DECOLORIZING and COOKING PROCESSES — K-C-2

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12500 Berea Road — Cleveland, Ohio

STEAM TURBINES
HELICAL GEARS
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CENTRIFUGAL BLOWERS AND COMPRESSORS
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TRENTON 2, NEW JERSEY

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CONSULTANTS ON ALL WATER PROBLEMS
BOILER, PROCESS AND MUNICIPAL WATER ★ WASTE AND SEWAGE DISPOSAL ★ CONSULTATION ★ DESIGN ★ ANALYSIS

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Paper is Our Business
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Rubber Products for
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BROAD EXPERIENCE IN MANUFACTURE OF PULP AND PAPER
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A COMPLETE LINE
OF TYCOL LUBRICANTS SCIENTIFICALLY ENGINEERED FOR EVERY INDUSTRIAL USE
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YOU'RE GOING TO NEED PAPER CONVERTING MACHINERY

NOW IS THE TIME TO DISCUSS IT

Only two of the many production machines in our line—complete details upon request.

For your post-war converting machinery requirements early planning will help you. Now is the time to place your orders for your anticipated converting machinery requirements.

We manufacture a line of converting machines you can depend on, including winders, creping machines, folders, embossers, printing presses, bundling presses, and miscellaneous or special machines.

PAPER CONVERTING MACHINE CO.
GREEN BAY, WISCONSIN
Manufacturers of paper converting machinery for all purposes

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AMORPHOUS WAXES
Melting Points 120° F. to 205° F.

For the Manufacture of

LAMINATING PAPER . . GLASSINES . . WATERPROOFING . . GREASE PROOFING . . EXTENDERS FOR PARAFFIN, FOOD CONTAINERS, CONTAINER LININGS, ADHESIVENESS AND PROTECTIVE COATING.

BUILT TO STAND THE GRIND OF HIGH SPEED QUALITY PRODUCTION. FOR EVERY GRADE OF PAPER THERE'S A SIZE AND TYPE TO MEET YOUR NEEDS
Langston
SLITTERS AND ROLL WINDERS
SHEAR CUT
CLEAN CUT
SAMUEL M. LANGSTON COMPANY, Camden, New Jersey

HOW OAKITE CLEANING HELPS MILLS ECONOMIZE ON MAINTENANCE!

Low-Cost Way To Keep Washrooms Sanitary!

Washrooms, locker rooms and lavatories are the natural habitats of obnoxious, unsanitary odors. Removing these odors is the first step in sanitizing washrooms. Oakite TRI-SAN is designed specifically to perform this and the two related sanitation tasks, disinfecting and cleaning, in the same operation!

Oakite TRI-SAN's triple action costs remarkably little . . . only a penny for adequate solution gallon. A free 20-page booklet telling Oakite TRI-SAN's whole story is yours on request. Write for your copy TODAY!

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Technical Service Representatives in All Principal Cities of the United States and Canada

OAKITE Specialized CLEANING

PAPER MACHINERY — VICTORY IS ACCLAIMED! — PAPER BAG MACHINERY

NOW—It is our responsibility to co-operate in the molding of an ENDURING PEACE.

THE SMITH & WINCHESTER MANUFACTURING COMPANY
SOUTH WINDHAM, CONNECTICUT

Solicit your inquiries for REPAIRS or NEW EQUIPMENT which will receive our prompt attention as rapidly as controlled materials and skilled labor are made available.

The New Model "E"

Paper Trimmer.

The Trade-Mark of
DEPENDABLE FELTS

The Waterbury Felt Co.
SKANEATELES FALLS, N. Y.

HELP WANTED

PLANT ENGINEER

Young man with technical knowledge and practical experience to take charge of all plant engineering and maintenance for a sulphite pulp and paper mill located in the Lake States area. Give full particulars in first letter, including training, experience, availability, and salary expected. Excellent opportunity for young man. Address Box No. 45-669 care Paper Trade Journal. O-18

COATING CHEMIST
FOR CONVERTING PLANT
LOCATED IN THE NEW
YORK METROPOLITAN AREA

List all information in first letter and interview will be arranged. Address Box 45-670 c/o Paper Trade Journal. N-1

WANTED

Graduate Chemist or Chemical Engineer with a technological background in the field of emulsions. Special consideration will be given to an individual with experience in the development and manufacture of wax and resin emulsions. This is an excellent opportunity for a man qualified for the position. Write fully of experience and qualification. Replies will be treated confidentially. Box 45-663 care Paper Trade Journal. N-8

SALARIED POSITIONS

$2,500-$25,000. Reconversion is creating lifetime opportunities now. This thoroughly organized confidential service of 35 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated. Retainers fee protected by refund provision. Identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
117 Delward Bldg., Buffalo 2, N. Y. TF

WANTED — ENGINEERS — Capable of handling general engineering work in established consulting engineers office specializing in pulp and paper mills. Address Box 45-469 care Paper Trade Journal. TF

WANTED—Tour Boss, Machine Tender, Back Tender, Shipping Clerk for one machine mill making folding grades. Extensive rebuilding program under way. Excellent opportunity for right men. Address Box 45-541 care Paper Trade Journal. O-25

MACHINE DESIGNER preferably with experience in paper mill or paper working machinery. Permanent position with good opportunity advancement. Location Brooklyn, New York. State complete details, age, experience and salary expected. Address Box 45-578 care Paper Trade Journal. TF

WANTED—One man to represent an Eastern paper converting mill through New York State. We will prefer one who has had some experience in paper sales, and who resides in the vicinity of Syracuse, N. Y. Address Box 45-596 care Paper Trade Journal. D-20

MERCHANDISE AND SALES MANAGER for nationally known paper bag manufacturing company seeking to develop sales of special purpose and transparent bags and flexible containers—opportunity—replies considered in strictest confidence—state experience and minimum compensation. Our employees aware of this advertisement. Address Box 45-529 care Paper Trade Journal TF

HELP WANTED

WANTED GENERAL LOGGING SUPERINTENDENT FOR MEXICO

Must be technically trained, experienced in pulp mill supply, capable of supervising extensive pulp wood operations in mountains and rough country and of locating and supervising construction of truck roads. Address reply to Box 45-634, Paper Trade Journal. O-18

WANTED—Man to represent an Eastern Paper converting mill throughout the New England States. We will prefer one who has had some experience with the jobbing trade in this area, and who resides in the vicinity of Boston, Mass. Address Box 45-616 care Paper Trade Journal. TF

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HELP WANTED—5c a word. Double rate for heavy face type. Minimum charge $1.25.

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All classified advertisements are payable in advance.

If box number is used—35 cents additional.

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PAPER TRADE JOURNAL
15 West 47th Street
New York 19, N. Y.

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CHARLES P. RAYMOND SERVICE Inc.
294 Washington St., Boston, Mass
Specializing in Paper Mill Personnel
Positions Now Open

Paper salesman for New England and Metropolitan New York
Mechanical engineers, designers and draftsmen (several)
Chemists and chemical engineers
Sales manager coarse paper (Middle-West)
Salesman for firm building paper mill machinery
Master Mechanics and plant engineers
Corrugated plant superintendent
Beater engineers
Millwrights and machinists
Tour boss
Chief Engineer (power) New York State mill.

We invite correspondence (strictly confidential) with employers seeking personnel and men seeking new positions. O-18

ATTENTION
PAPER MILL ENGINEERS

The Bryant Paper Company of Kalamazoo, Michigan, has immediate need for an Assistant Paper Mill Engineer, whose services are required in helping to develop Bryant's rebuilding and expansion program now under way.

Bryant is located in Kalamazoo, one of the finest cities in the Middle West. Kalamazoo is known as the paper center of the world. It is a college town with fine public schools and varied civic interests. It is an ideal place to live.

This position offers an excellent opportunity for the right man. Please communicate at once with Merton S. Fogerty,

BRYANT PAPER COMPANY
Kalamazoo, Michigan
O-18

WANTED

PULP AND PAPER MILL ENGINEERS—RESIDENT ENGINEER for construction new kraft mill in the South and plant engineer after completion. Also general designing engineers and draftsmen experienced in industry. Replies held confidential. Address Box 45-614, Paper Trade Journal. O-18

SALES ENGINEER with knowledge of Pulp and Paper Machinery and experience in merchandising. Write giving background, references and salary expected. Address Box 45-606 care Paper Trade Journal. TF

WANTED—Layout Man experienced on pulp and paper mill machinery. Give employment history and background in first letter. Valley Iron Works Co., Appleton, Wisconsin. N-1

WANTED—A Machine Tender on a Fourdrinier Machine. This machine will run between three hundred (300) and nine hundred (900) feet a minute. Address Box 45-619 care Paper Trade Journal. TF

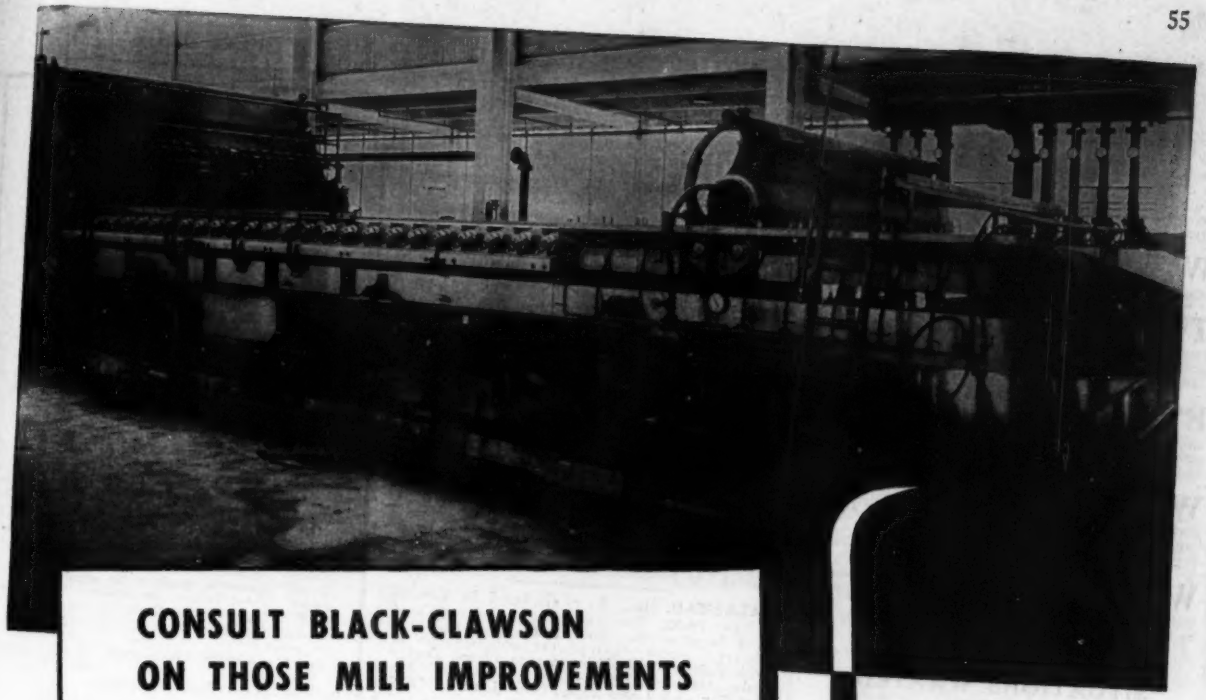
WANTED—Experienced paper mill engineer, capable of handling maintenance, reconstruction, etc. College graduate preferred but not essential. Keuka Paper Corporation, Penn Yan, N. Y. O-18

PAPER SLITTING MACHINE Operators on Adding Machine and Teletype Rolls. Plant located in Chicago. Opportunity for advancement. High wages, steady work, overtime. Address Box 45-648 care Paper Trade Journal. O-25

WANTED—Graduate mechanical engineer to take complete charge of large modern high pressure power plant. Location Middle West. Please state age, experience and salary expected. Address Box 45-644 care Paper Trade Journal. O-25

BEATER ENGINEERS—Old established Southern California mill has an opening for two experienced beater engineers. Write full particulars. Address Box 45-638 care Paper Trade Journal N-1

WANTED—Machine Tenders, Backtenders, Windermen and Beater Engineers for cylinder machine making .009 Board, .016 Jute Liner and Imitation Kraft Wrapping Paper. Must have experienced men. Sangamon Paper Mills, 3915 S. LaSalle Street, Chicago, Illinois. N-8



CONSULT BLACK-CLAWSON ON THOSE MILL IMPROVEMENTS

Now that WPB's L-83 has been withdrawn you can win your "DSC" by spotting improvements to make about your mill—and the sooner the better.

Go forth and size up your pulping, your refining, your pumping and agitation. Are your chests adequate and properly located?

How is your paper machine doing? Does it need a "shot in the arm" at the forming end, the press, the dryer, the finishing end? And your drives!

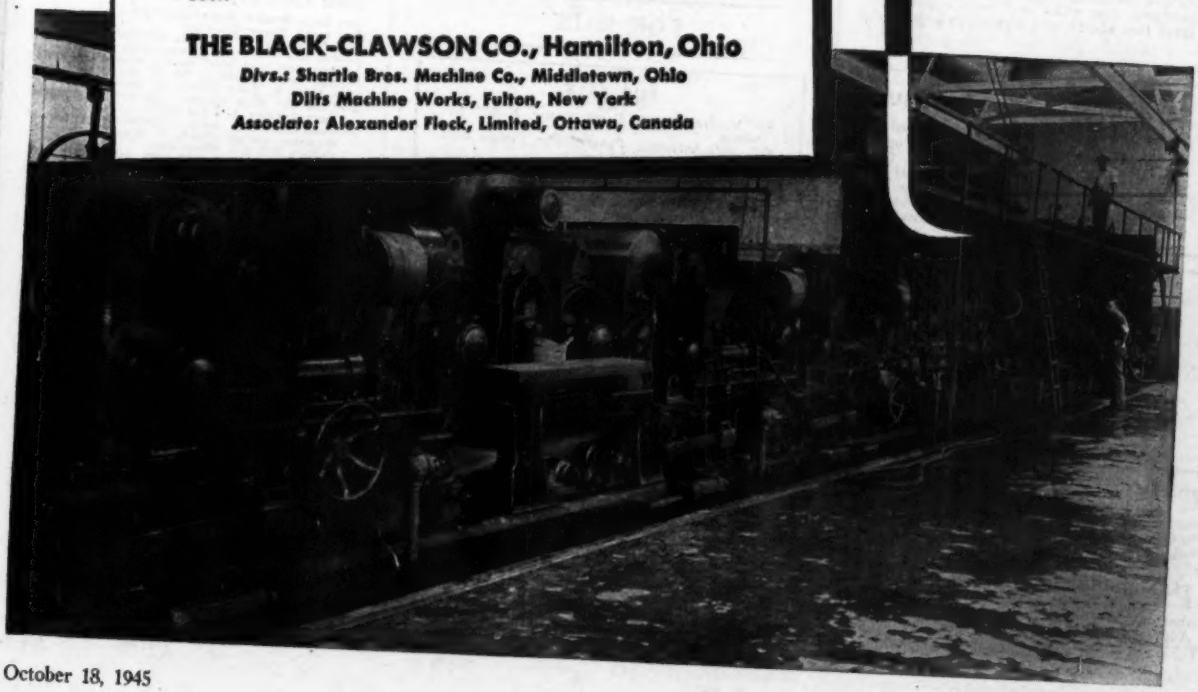
On any and all of these points the Black-Clawson organization could be of service.

Should you even contemplate building an entire new machine Black-Clawson engineers stand ready to sit down with you, help work out special features, and estimate the cost.

THE BLACK-CLAWSON CO., Hamilton, Ohio

Divs.: Shartle Bros. Machine Co., Middletown, Ohio
Dilts Machine Works, Fulton, New York
Associate: Alexander Fleck, Limited, Ottawa, Canada

Cylinder machines any size. Fourdrinier machines up to 240" for high-speed operation.



HELP WANTED

CHEMIST having several years practical paper mill experience for paper research development, and control work, with large manufacturer of diazo sensitized reproduction papers. Give complete information regarding education, pertinent personal data and references in first letter. Address Box 45-665 care Paper Trade Journal. N-8

WANTED—Experienced Back Tender on Cylinder Machine. Apply Personnel Office, Southland Paper Mills, Inc., Lufkin, Texas. N-1

TOUR BOSS wanted to be trained for job of Assistant Superintendent of Roofing Felt Mill located in New Orleans. Send complete resume giving experience, etc. to Box 45-662 care Paper Trade Journal. N-1

BOOKKEEPER WANTED—Old established paper merchant in Washington, D. C., requires first-class bookkeeper, understanding tax matters; top salary—good housing. Address Box 45-661 care Paper Trade Journal. O-25

WANTED—Purchasing Agent for large Southeastern Pulp and Paper Mill. Excellent opportunity. In answering this ad give your past experience, age, education, references, etc. Address Box 45-660 care Paper Trade Journal. O-18

WANTED—Chief Engineer. Must be experienced in paper mill work. For mill in Indiana. Reply to Sangamon Paper Mills, 3915 S. La Salle Street, Chicago, 9, Illinois. O-18

SITUATIONS WANTED

PAPER SALESMAN at present covering the jobbing trade in Pennsylvania, New Jersey, Delaware, Maryland, Virginia and North Carolina as a mill representative desires to operate over the same territory as a representative for three of four non-conflicting lines. Address Box 45-435 care Paper Trade Journal. O-25

ASSISTANT SUPERINTENDENT OR SUPERINTENDENT

Age 32. Jobs held—Fourth Hand to Spare Machine Tender, Assistant Superintendent. Technical education. Five years practical experience on book papers, plus five years in management, making kraft specialties, including creped. Fourdriniers. Dependable. Get along well with others. Address Box 45-555 care Paper Trade Journal. N-1

PAPER MILL ENGINEER MILL SUPT.

20 years various mills. Experienced all phases administration, production, operation, development, reconstruction. Good organizer. Desires change. Personal reasons. Seeking opportunity to manage mill. Replies confidential. References. Address Box 45-566 care Paper Trade Journal TF

POSITION WANTED

Executive, 25 years experience covering the management of mills. Re-designing and building all types of machines for higher speeds, converting and general engineering. Field covers all types of machines, making all grades of tissue. Temperate and of high character. Any replies to this advertisement, will be kept in the strictest confidence. Address Paper Trade Journal, Box 45-643. O-25

CHEMICAL ENGINEER—M.I.T., expert in board, straw, nine point corrugating processes, formulations, available full time or on consultation basis. Address Box 45-641 care Paper Trade Journal. O-25

PAPER CHEMIST with wide and varied experience, seeks position with fiber board company that makes coated and general grades of board. Address Box 45-640 care Paper Trade Journal. O-25

SITUATIONS WANTED

PAPER MILL SUPERINTENDENT—Now available. Seeks position Supt. or Asst. Supt. Converting grades, Kraft, Tissues. Address Box 45-671 care Paper Trade Journal. N-1

ENGINEER experienced in design, construction, maintenance and operation of mills, is open for temporary or permanent position. Address Box 45-668 care Paper Trade Journal. N-1

PULP AND PAPER MILL ENGINEER—Graduate, Professional Mechanical Engineer experienced in administration, production, operation, construction and maintenance, desires position as plant engineer. Young, energetic, capable, reliable and experienced.. Replies confidential. Address Box 45-667 care Paper Trade Journal. O-18

FIRST CLASS All around Master Mechanic. Construction. Maintenance in Fourdrinier, Cylinder Mills making board, tissue, kraft. Stea. Water Electric Power. Address Box 45-666 care Paper Trade Journal. N-1

SUPERINTENDENT—20 years experience in paper bag conversion of grocery, sacks and aniline or oil ink specialty bags. Capable of handling all bag shop problems. Thorough experience in supervision of help, maintenance and repairing of machines. Address Box 45-658 care Paper Trade Journal. N-8

SALESMAN, 49. Now employed in Central New York. Plans to locate on West Coast about January 1st. Best entree paper and pulp industry. Desires to represent manufacturers of Stock Valves, Dryer Felts, Screen Plates, Doctor Blades, Machine Aprons, Carrier Rope, etc. Address Box 45-659 care Paper Trade Journal. O-18

AVAILABLE. Man capable of taking complete charge of gummed tape manufaoturing. Also allied producta. Address Box 45-614 care Paper Trade Journal. O-25

MECHANICAL ENGINEER—Paper, pulp and Boardmill experience. Professional and Structural Engineer. Design, construction, cost estimates, steam and power utilization, heat balances, economic studies, process work. Can take charge of post war development. Address Box 45-627 care Paper Trade Journal. O-18

PLANT ENGINEER with 18 years experience in supervision, production, research, maintenance, construction and power in fine papers, pulp and paper insulboard mills. Wants to change to a mill in or near New England. 40 years old. Technical graduate. Development work desired. Address Box 45-637 care Paper Trade Journal. O-25

FOR SALE

FOR SALE

80" Waldron 6-Roll Brush Coater & 64" Rewinder
48", 72" Automatic Power Paper Cutters with new knives
32", 40", 52" Single & Double Roll Coaters
14"x22", 26"x38" Thomson & 30"x50" Cottrell Die Cutters.
40", 50", 56" MIEHLE Printers—or can be converted to Die Cutters
15½"x18" Seybold 4-Post Embosser, with Elec. Heat. Attach.
ALSO CREASERS, SLITTERS, GLUERS, BOX STITCHERS, WRAPPERS, ENDERS, CORNER CUTTERS, SLITTERS & REWINDERS—all in many sizes and makes. All offered REBUILT & GUARANTEED. Write for Bulletin No. 124. Listing over 100 Paper & Board Converting Machines—now on our floor.

SOUTH WABASH ENGINEERING CO.
2937 South Wabash Ave.
CHICAGO, ILLINOIS N-8

FOR SALE

14 dryers 60 x 174", Sheahan carrier anti-friction bearings, felt rolls, framework.

SHARTLE BROS. MACHINE CO.
Middletown, Ohio O-25

FOR SALE

FOR SALE

1—Saveall 36" x 136" Cylinder Mold equipped with anti-friction bearing and couch roll.
1—Valley Iron Screw Press.
1—#2 Miami Jordan.
1—#9 Emerson Jordan for direct connection to a motor, requires use of 400 H.P. motor.
1—Shartle Brothers Duplex 10 x 20 Stock Pump.
1—Moore & White 10 x 12 Triplex Stock Pump.
2—2000 lb. Holyoke Beaters.
1—1000 lb. Dayton Beater.
1—Jones pulper — direct connected to 60 H.P. motor.
2—12 Plate Packer type flat screens with steel vats.
2—8 Plate Flat Screens.
1—12 Plate Flat Screen.
1—18 Plate Flat Screen with scraper.
13—Driers 60" x 154".
23—Driers 36" x 82".
1—Buffalo Pump—5500 g. p. m., direct connected to 100 H.P. Motor (50' head).
3—Worthington turbine well pumps, 300 g.p.m.—for 14' and 16'—with motor.
1—#4 Roots-Connersville Vacuum Pump.
2—65" Cameron tensions for winders.
2—63" Dietz Toilet Converters.
1—81" Dietz Toilet Converter.
1—60" Hudson Sharp 2 shaft slitter and winder.
1—72" Kidder two drum slitter and winder.
3—#2 Nash Vacuum Pumps.

Various sizes of Centrifugal Pumps. Write us regarding your particular requirements.

We are always in the market to purchase your surplus or idle machinery. What have you to offer?

J. J. ROSS COMPANY
250 Frelinghuysen Ave.
Newark 5, N. J.
Bigelow 3-3720 O-18

REVAMPING AND BUILDING MILL AND CAN OFFER FOR SALE

One large Breaker Beater complete
One small Beater Complete
1—80" Diameter X 90" Face cylinder mold
1—8x4 Shartle Duplex plunger steel pump
1—New pair cast steel double suspension spring type beater bearings for 8" diameter journal—Noble & Wood beater roll. Never used
1—Used old style lighter beam for 8" diameter journal Noble & Wood beater
1—New reinforced design lighter beam for 8" diameter journal—Noble & Wood beater roll. Pattern No. 983. Never used.
3—300 KVA —33000-2300/4000 volts transformers
60—62" Face steel dryer felt rolls—1—7/16" journals
1—20" Face cast iron taper pulley—2 15/16" bore taper 31"x29½"
4—36" diameter x 83" face dryers
1—8" to 10" Cox & Sons Pipe threading machine
1—40" Noble & Wood impeller for circulation stock in beater.

A visit to the mill would prove profitable as we have many items for sale to numerous to mention. See our superintendent Mr. O. P. Fussell at our plant in Walloomsac, New York.

WALLOOMSAC PAPER MILLS, INC.
Mills: Walloomsac, New York
Main Office: 25 Vanderbilt Avenue
New York 17, New York TF

FOR SALE

Complete two cylinder Paper Mill presently in operation. 150 miles New York City.

Additional details on request.

J. J. ROSS COMPANY
250 Frelinghuysen Ave., Newark 5, N. J.
Bigelow 3-3720 O-18

FOR SALE | FOR SALE | FOR SALE

Ross Paper Machinery Co., 265 Passaic St., Newark 4, N. J., Humboldt 2-2177

68" Trim 3 Cylinder Machine—19 Dryers—2 Calender Stacks.

Additional Information on request.

BEATERS
1—2500 lb. Downingtown Iron Tub
1—750 lb. Downingtown Iron Tub
2—1000 lb. Horne Iron Tub
1—1300 lb. Holyoke Wood Tub

CALENDER STACKS
1—10 Roll Farrell 104" Warren Doctors
1—11 Roll Pusey & Jones 104" Warren Doctors

CONVERTING EQUIPMENT
1—Bliss Double Head Stitcher
1—Bliss Single Head Stitcher
1—Bliss Box Assembling Machine
1—66" Dietz Towel Winder
4—Waterville Grinders
1—86" Waldron Reeling Machine
1—30" Dampening Machine
1—36" Brush Coating Machine
1—Copper Mixing Tank with agitator—40 gal.
1—Cast Iron Kettle 20" x 24" 2 outlets

CONVEYOR
1—Standard Conveyor 30' long on wheels for handling bales of pulp. Direct connected to 5 h.p. motor.

DRYERS
4—60" diameter x 174" face framed and geared.
1—36" diameter x 102" face with bearings.
19—36" diam. x 68" face—2 deck frames, gears, bearings, etc.
8—48" diam.—102" face—2 deck frames.
40—36" diam. 86" face 3 deck frames
18—36" diam. 82" face 2 deck frames
40—28" diam. 96" face 2 deck frames

FESTOON DRYERS
100" Proctor & Schwartz
60" Proctor & Schwartz

FLAT SCREENS
1—Moore & White 8 Plate
1—Moore & White 10 Plate
2—Sandy Hill Packer 8 Plate with Scrapers.
1—Sandy Hill Packer 10 Plate
1—Trimbey Pulp Screen 30 ton cap.

JORDANS
1—E. D. Jones Standard motor drive
1—Dillon No. 2 Motor drive
1—Appleton No. 3 motor drive

KNIFE GRINDER
1—72" Seybold automatic used one year

MISCELLANEOUS
1000—Cameron slightly used Slitter Knives—$1.00 each. Purchased from a war cancellation.
1—Warren Broke Target with pump
2—Yankee Dryer doctor oscillators (Beloit)
2—Nugent Oil Filters (new)
2—Beloit Fourdrinier Shakes

MOTORS
5—1000 h.p. motors, 2300 volts with all controls.
1—30 h.p. 600 R.P.M. 2300 V. 3 Ph. 60 cy.
1—40 H.P. 3600 R.P.M. 2300 V. 3 Ph. 60 cy.

PLATERS
2—Holyoke 2 Roll 18" dia. 36" face

PULLEYS
185—Cone Lift and Solid Cast Iron Pulleys. *Various Sizes.*

PULP EQUIPMENT
Complete Ground Wood Mill—
5—Sandy Hill four pocket Grinders. Each direct connected to 1000 h.p. motor, 2300 volts. 27" stones. Spare stones, etc. Excellent condition. Will sell all or part.
2—Pusey & Jones vertical Digesters (welded) 7' dia., 24' high 125 lb. pressure
8—Horizontal Digesters 15' diam. 47' face 150 lb. pressure
3—Improved No. 2 Knotters
1—Nichols-Herreshoff Lime Kiln
1—Williams No. 30 Bark Hog
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1—36" Bauer Bros. Single Revolving Disc Mill. Direct connected to 50 h.p. motor, 3 phase, 60 cycles, 220 volts, 1160 r.p.m.

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1—Voith Pulper No. 1-20 tons cap.

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1—Oliziti Acid 3" Suction.
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1—Midwest 6" stock pump

REELS
3—Pusey & Jones 104" face 18" dia. bowls
1—Pusey & Jones 115" face 18" dia. bowls
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1—10" Wiener Refiner with Regulating Valves.

RIGHT ANGLE WORM GEAR DRIVES
1—Cleveland 2 H. P.—10 to 1 ratio.
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RESULTS

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933
Of PAPER TRADE JOURNAL, published weekly at East Stroudsburg, Pa., for October 1, 1945.
State of New York } ss.:
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Arthur E. Gordon, who, having been duly sworn according to law, deposes and says that he is the Business Manager of the PAPER TRADE JOURNAL and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are: Publisher, George E. Lockwood, 15 West 47th st., New York 19, N. Y.; Editor, Wilfred L. Cook, 15 West 47th st., New York 19, N. Y.; Managing Editor, None; Business Manager, Arthur E. Gordon, 15 West 47th st., New York 19, N. Y.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Lockwood Trade Journal Co., Inc., 15 W. 47th st., New York 19, N. Y. Stockholders: Geo. E. Lockwood, 15 West 47th st., New York 19, N. Y.; A. J. Pearson, 15 West 47th st., New York 19, N. Y.; Samuel Mayer, 15 West 47th st., New York 19, N. Y.; John Banninga, 15 West 47th st., New York 19, N. Y.; T. R. Lasser, 15 West 47th st., New York 19, N. Y. Edythe Z. Ellison, 15 West 47th st., New York 19, N. Y.; George Saxe Macdonald Trust, Bankers Trust Co., 16 Wall st., New York 5, N. Y.; Geo. E. Lockwood, J. K. Lasser, 15 West 47th st., New York 19, N. Y., Trustees.

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5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the twelve months preceding the date shown above is ——. (This information is required from daily publications only.)

ARTHUR E. GORDON.
(Signature of Business Manager.)

Sworn to and subscribed before me this 10th day of October, 1945.)
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Moore & White Co.
Noble & Wood Machine Co.
Norwood Engrg. Co.
D. J. Murray Mfg. Co.

DYESTUFFS
Calco Chemical Co.
Ciba Company
E. I. du Pont de Nemours & Co.
Geigy Co., The
General Dyestuff Corp.
National Aniline Division, Allied Chemical & Dye Corp.
Paper Makers Chemical Department, Hercules Powder Co.
C. K. Williams & Co.
Witco Chemical Co.

EQUIPMENT INSTALLATION
Merritt-Chapman & Scott Corp.

EVAPORATORS
Black-Clawson Company
Goslin-Birmingham Mfg. Co., Inc.
Murray, D. J., Mfg. Co.
Swenson Evaporator Co., Div. of Whiting Corp.
Traylor Engineering & Mfg. Co.

FANS
General Electric Co.
B. F. Perkins & Son, Inc.
Ross Engineering Co., J. O.

FEEDERS
Builders-Providence, Inc.
Merrick Scale Mfg. Co.
Leeds & Northrup
Traylor Engineering Co.
Wallace & Tiernan

FELTS
Appleton Woolen Mills
Asten-Hill Mfg. Co.
Bloomfield Woolen Co.
Bulkley, Dunton Pulp Co. Inc.
Draper Bros. Corp.
Huyck & Son, F. C.
Leckport Felt Co.
Mt. Vernon-Woodbury Mills, Inc.
Morey Paper Mill Supply Co.
Orr Felt & Blanket Co.
Shuler & Benninghofen
Waterbury Felt Co.
Woodward, Baldwin & Co.

FELT GUIDES
Moore & White Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John

FILLERS
American Colloid Co.
Amer. Cyanamid & Chem. Corp.
American Resinous Chemicals Corp.
W. H. Loomis Talc Corp.
Vanderbilt Co., R. T.
Witco Chemical Co.

FILTERS
Moore & White Co.
J. O. Ross Engrg. Corp.
Worthington Pump & Mchy. Corp.
Witco Chemical Co.

FLOORING, GRATING & TREADS
Hendrick Mfg. Co.
Norton Co.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc.
United States Rubber Co.

FORMING MACHINES
Downingtown Mfg. Co.
Noble & Wood Machine Co.
Oliver United Filters
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

GEARS
Black-Clawson Company
De Laval Steam Turbine Co.
Downingtown Mfg. Co.
Farrel-Birmingham Co.
E. D. Jones & Sons Co.
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

WHERE TO BUY

Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Waldron Corp., John

GRINDERS
Farrel-Birmingham Co.
Lobdell Car Wheel Co.
Montague Machine Co.
Norton Company
Samuel C. Rogers and Company
The Sandy Hill Iron & Brass Works

GRINDING WHEELS
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
Norton Company
Simonds Worden White Co.
United States Rubber Co.

HEATING, VENTILATING AND AIR CONDITIONING
The Appleton Machine Co.
Armstrong Machine Works
Fibre Making Processes, Ind.
E. D. Jones & Sons Co.
General Electric Co.
Grinnell Company
Leeds & Northrup
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
Ross Engineering Corp., J. O.
Shartle Brothers Machine Co.
Stickle Steam Specialties Co.
Valley Iron Works Co.
Worthington Pump & Mchy Corp

HOISTS
Appleton Machine Co.
Dilts Machine Works
Rodney Hunt Machine Co.
Ingersoll-Rand Co.
E. D. Jones & Sons Co.

HOSE (Air, Water, Suction, etc.)
The Cincinnati Rubber Mfg. Co.
The Manhattan Rubber Manufacturing Division of Raybestos-Manhattan Inc.
United States Rubber Co.

HUMIDITY CONTROL
Steamaire Company

INSTRUMENTS, TESTING AND MEASURING
W. H. & L. D. Betz
N. P. Bowsher
The Bristol Company
Builders-Providence, Inc.
The Foxboro Company
General Electric
W. & L. E. Gurley
Leeds & Northrup Company
National Technical Laboratories
B. F. Perkins & Son
Taber Instrument Corp.
Taylor Instrument Cos.
Thwing-Albert Instrument Co.
Wallace & Tiernan Co., Inc.

JORDAN FILLINGS
Appleton Machine Co.
Bahr Brothers Mfg. Co.
E. D. Jones & Sons Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

KNIVES
Black-Clawson Company
Dilts Machine Works, Inc.
Hamblet Machine Co.
E. D. Jones & Sons Co.
Simonds Worden White Co.
Valley Iron Works Co.

LABORATORY EQUIPMENT
Appleton Machine Co.
W. H. & L. D. Betz
Dilts Machine Works
E. D. Jones & Sons Co.
Leeds & Northrup Company
National Technical Laboratories
Noble & Wood Machine Co.
Taber Instrument Co.
Taylor Instrument Companies
Valley Iron Works Co.

LAY BOYS
Hamblet Machine Co.
Moore & White Co.
Shartle Brothers

LUBRICANTS
Gulf Oil Corporation
Gulf Refining Co.
Sinclair Refining Co.
Socony-Vacuum Oil Co., Inc.
Sun Oil Company
The Texas Company
Tide Water Associated Oil Co.

LUBRICATORS
Hills-McCanna Co.

MATERIAL HANDLING
Northwest Engrg. Co.

MICROMETERS & CALIPERS
Farrel-Birmingham Co.
Montague Machine Co.
Lobdell Car Wheel Co.
Walker-Goulard-Plehn Co.

MIXERS
H. K. Porter Company
Youngstown Welding & Engrg. Co.

MOISTENING EQUIPMENT
The Spray Engineering Co.

MOISTURE CONTENT CONTROL
Steamaire Company

MOTORS AND GENERATORS
Allis-Chalmers Mfg. Co.
De Laval Steam Turbine Co.
General Electric Co.
Ingersoll-Rand Co.
Reliance Electric & Engrg. Co.
Westinghouse Electric Corporation

PACKING BOXES
Johnson Corporation
Shartle Brothers Machine Co.

PACKING
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
United States Rubber Co.

PAPER MACHINES
Black-Clawson Company
Downingtown Mfg. Co.
Thomas W. Hall Co.
Moore & White Co.
Pusey & Jones
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester

PAPER MACHINE SLICES
Black-Clawson Company
E. D. Jones & Sons Co.
Montague Machine Co.
The Sandy Hill Iron & Brass Works
Valley Iron Works Co.

PAPERMILL BUILDERS
Merritt Chapman & Scott Corp.

PAPER TUBE MACHINERY
Dietz Machine Works
Thomas W. Hall Co.
Hudson Sharp Machine Company
Langston Co., Samuel M.

PASTING MACHINES
Black-Clawson Company
Davis, Frank H., Co.
Murray, D. J., Mfg. Co.
Moore & White Co.
Potdevin Machine Co.
Shartle Brothers Machine Co.
Waldron Corp., John

PERFORATED METAL
Allis-Chalmers Mfg. Co.
Harrington & King Perforating Co.
Hendrick Mfg. Co.

PIPE
Black-Clawson Company
Crane Company
Grinnell Company
Shartle Brothers Machine Co.
Stowe-Woodward Inc.
Taylor Forge & Pipe Works
Walworth Company
Youngstown Welding & Engrg. Co.

PLATERS
Perkins & Son, Inc., B. F.

PLATES
Black-Clawson Company
Hendrick Mfg. Co.
J. O. Ross Engrg. Corp.
Shartle Brothers Machine Co.
Timken Roller Bearing Co.

PLUGS
Black-Clawson Company
E. D. Jones & Sons Co.
The Noble & Wood Machine Co.
Shartle Brothers Machine Co.

PRESSES
Black-Clawson Company
Farrel-Birmingham Co.
Dietz Machine Wks.
Thomas W. Hall Co.
Hudson-Sharp Machine Co.
Paper Converting Machine Co., Inc.
Potdevin Machine Co.
Rotogravure Engineering Co.
Shartle Brothers
Valley Iron Works Co.
Waldron Corp., John
Weber, Homer G.

PUG MILLS
Traylor Engineering & Mfg. Co.

PULPS
Andersen Co., J.
Bulkley, Dunton Pulp Co., Inc.
Gottesman & Co., Inc.
Ilof Hansson, Inc.
Perkins-Goodwin Co.
Price & Pierce, Ltd.
Pulp and Paper Trading Co.

PULPSTONES
Norton Company

PUMPS
Allis-Chalmers Mfg. Co.
Black-Clawson Company
Dorr Company
Downingtown Mfg. Co.
De Laval Steam Turbine Co.
Frederick Iron and Steel Co.
Hills-McCanna Co.
Ingersoll-Rand Co.
Johnson Corp.
Moore & White Co.
Nash Engineering Co.
Noble & Wood Machine Co.
Paper Converting Mch. Co.
Quimby Pump Co. Div. of H. K. Porter Company, Inc.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Steamaire Company
Warren Steam Pump Company
Worthington Pump & Machinery Corp.

RECOVERY SYSTEMS
Bulkley, Dunton Pulp Co., Inc.
Rodney Hunt Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Pusey & Jones
Ross Engineering Corp. J. O.
Valley Iron Works Co.

RECTANGULAR BINS
Traylor Engineering & Mfg. Co.

REELS
Black-Clawson Company
Downingtown Mfg. Co.
De Laval Steam Turbine Co.
Hudson Sharp Machine Company
The Kohler System Company
Montague Machine Co.
Moore & White Co.
Paper Converting Mch. Co.
Rodney Hunt Machine Co.
Rotogravure Engrg. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
The Smith & Winchester Mfg. Co.

REFINERS
Appleton Machine Co.
Bahr Brothers Mfg. Co.
Bauer Brothers Co.
Dilts Machine Works
The Hermann Manufacturing Co.
E. D. Jones & Sons Co.
Murray, D. J. Mfg. Co.
Noble & Wood Machine Co.
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Sprout, Waldron & Co.
Sutherland Refiner Corp.
Valley Iron Works

REGULATORS
Allis-Chalmers Mfg. Co.
Armstrong Machine Works
Bird Machine Company
The Bristol Company
The Brown Instrument Co.
The Foxboro Company
Jones, E. D., & Sons Co.
General Electric Co.
Johnson Corp.
Leeds & Northrup Company
National Technical Laboratories
Noble & Wood Machine Co.
Shartle Brothers
Stickle Steam Specialties Co.
Taylor Instrument Companies
Wallace & Tiernan
Westinghouse Electric Corporation

RESINS
American Cyanamid & Chemical Corp.
American Resinous Chemicals Corp.
Glidden Corp.
The Resinous Products & Chemical Co.

ROLLS
Appleton Machine Co.
Black-Clawson Company
Downingtown Mfg. Co.
Farrel-Birmingham Co.
Improved Paper Machy. Corp.
Lobdell Co.
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
Montague Machine Co.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
Perkins, B. F., & Sons Co.
Pusey & Jones Corp.
Roeblen Engraving Co.
J. J. Ross Company
Rodney Hunt Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Shenango-Penn Mold Co.
Sinclair Co.
Smith & Winchester Mfg. Co.
Stearns Magnetic Mfg. Co.
Stowe-Woodward Inc.
United States Rubber Co.
Valley Iron Works Co.
Waldron Corp., John

ROLL COVERS
The Cincinnati Rubber Mfg. Co.
Stowe-Woodward Inc.
Youngstown Welding & Engrg. Co.

ROLL STANDS
Cameron Machine Co.
Johnstone Eng. & Machine Co.
The Kohler System Company
Moore & White Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.

ROTARY KILNS
Traylor Engineering & Mfg. Co.

SATURATING MACHINES
Black-Clawson Company
Moore & White Co.
Noble & Wood Machine Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
Waldron Corp., John
Weber, Herman C.

SCALES
Builders-Providence, Inc.
Merrick Scale Mfg. Co.

SCREEN PLATES
Fitchburg Screen Plate Co.
Magnus Metal Corp.
Morey Paper Mill Supply Co.
Union Machine Co.
Union Screen Plate Co.

SCREENS
Allis-Chalmers Mfg. Co.
Appleton Wire Works
Appleton Machine Co.
Bird Machine Company
Carthage Machine Co.
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Harrington & King Perforating Co.
Hendrick Manufacturing Co.
E. D. Jones & Sons Co.
Montague Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Traylor Engineering & Mfg. Co.
Valley Iron Works Co.

SCRUBBERS
Traylor Engineering & Mfg. Co.

SHEET MACHINES
Thomas W. Hall Co.
The Harmann Manufacturing Co.
Noble & Wood Machine Co.
Rotogravure Engrg. Co.
Valley Iron Works Co.

SHOWER PIPES
Bird Machine Company
A. E. Broughton & Co.
Downingtown Mfg. Co.
Improved Paper Machy. Corp.
Moore & White Co.
Shartle Bros. Mach. Co.
Smith & Winchester Mfg. Co.

SHREDDERS
Bauer Brothers Co.
Carthage Machine Co.

SIZING
American Cyanamid & Chemical Co.
American Resinous Chemicals Corp.
Black-Clawson Company
The Dow Chemical Co.
du Pont, E. I., de Nemours & Co.
National Oil Products Co.
Paper Makers Chemical Department, Hercules Powder Co.
Pioneer Salt Company
Socony-Vacuum Co.
Philadelphia Quartz Co.

SLITTERS
Black-Clawson Company
Cameron Machine Co.
Carthage Machine Co.
Dietz Machine Works
Downingtown Mfg. Co.
Thomas W. Hall Co., Inc.
Hamblet Machine Co.
Hudson Sharp Machine Company
Johnstone Eng. & Machine Co.
Langston Co., Samuel M.
Moore & White Co.
D. J. Murray Mfg. Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Waldron Corp., John

SOLENOID VALVES
Steamaire Company

SPRAY NOZZLES
The Spray Engineering Co.

STAINLESS STEEL
Allegheny Ludlum Steel Co.
Eastern Stainless Steel Corp.
Industrial Steels, Inc.

STARCH
American Cyanamid & Chemical Corp.
Clinton Co.
National Starch Products, Inc.
Stein, Hall & Co., Inc.

WHERE TO BUY

STEAM SPECIALTIES
Johnson Corp.
Nashle Bros. Mch. Co.
Stickle Steam Specialties Co.
STRAPPING & STRAPPING MACHINES
Acme Steel Company
The Stanley Works
STUFF CHESTS
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.
SUCTION BOXES
Black-Clawson Company
A. E. Broughton & Co.
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Westinghouse Electric Corp.
SULPHUR
American Cyanamid & Chemical Corp.
Stauffer Chemical Company
Texas Gulf Sulphur Co.
Witco Chemical Company
SULPHUR BURNERS
Valley Iron Works Co.
SULPHUR DIOXIDE
Ansul Chemical Company
TALC
American Cyanamid & Chemical Corp.
W. H. Loomis Talc Corp.
International Talc Company
TANKS
Frederick Mfg. Co.
E. D. Jones & Sons Co.
Kalamazoo Tank & Silo Co.
The Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.
The Noble & Wood Machine Co.
H. K. Porter Company Inc.
Rodney Hunt
J. O. Ross Engrg. Corp.
Shartle Brothers Machine Co.
Stowe-Woodward Inc.
Traylor Engineering & Mfg. Co.
United States Rubber Co.
Waldron Corp., John
Youngstown Welding & Engrg. Co.
THICKENERS, DECKERS & SAVEALLS
Bird Machine Company
Bulkley, Dunton Pulp Co. Inc.
Carthage Machine Co.
Dilts Machine Works
Dorr Co.
Downingtown Mfg. Co.
Montague Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.
TITANIUM
E. I. Du Pont de Nemours & Co.
Titanium Pigment Co.
R. T. Vanderbilt Co.
Witco Chemical Company
TOOLS
Acme Steel Company
Ingersoll-Rand Co.
The Stanley Works
Walworth Company
TRUCKS
Automatic Transportation Co.
Elwell Parker Electric Co.
Wright-Hibbard Ind. Elec. Truck Co.
TRAPS
Armstrong Machine Works
Crane Co.
Grinnel Company
Johnson Corporation
Shartle Bros. Mch. Co.
TUBS
Rodney Hunt Machine Co.
Noble & Wood Machine Co.
Shartle Brothers
Valley Iron Works Co.
TURBINES
Allis-Chalmers Mfg. Co.
De Laval Steam Turbine Co.
General Electric Company
Hunt, Rodney, Mach. Co.
Westinghouse Electric Corp.
Worthington Pump & Machinery Corp.
USED EQUIPMENT
Frank H. Davis Company
Gibbs-Brower Co.
Thomas W. Hall Co.
Noble & Wood Machine Co.
Rotogravure Engrg. Co.
J. J. Ross Company
Shartle Brothers Machine Co.
VALVES
The Bristol Company
Crane Company
Dilts Machine Works
Fibre Making Processes, Inc.
The Foxboro Company
Hills-McCanna Co.
E. D. Jones & Sons Co.
Kennedy Valve Mfg. Co.
Magnus Metal Corp.
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
The Permutit Company
William Powell Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Stickle Steam Specialties Co.
Taylor Instrument Companies
Valley Iron Works Co.
Walworth Company
VATS & VAT PARTS
Union Machine Co.
Union Screen Plate Co.
WASHERS
Bird Machine Company
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Works
Rodney Hunt Machine Co.
Shartle Brothers Machine Co.
Valley Iron Works Co.
WATER CONDITIONING
The Permutit Company
WAXING MACHINERY
Black-Clawson Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
Waldron Corp., John
Weber, Herman C.
WELDING EQUIPMENT
Allis-Chalmers Mfg. Co.
General Electric Company
Walworth Company
Westinghouse Electric Corp.
WET MACHINES
Black-Clawson Co.
Carthage Machine Co.
Downingtown Mfg. Co.
Moore & White Co.
Montague Machine Co.
Noble & Wood Machine Co.
Pusey & Jones Corp.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
WINDERS AND REWINDERS
Black-Clawson Company
Cameron Machine Co.
Dietz Machine Works
Downingtown Mfg. Co.
Thomas W. Hall Co.
Hudson-Sharp Mach. Co.
Langston Co., Samuel M.
Johnstone Eng. & Machine Co.
The Kohler System Company
Montague Machine Co.
Moore & White Co.
Paper Converting Mch. Co.
Potdevin Machine Co.
Pusey & Jones Corp.
Rotogravure Engrg. Co.
J. J. Ross Company
The Sandy Hill Iron & Brass Works
Smith & Winchester Mfg. Co.
Waldron Corp., John
WIRES
Appleton Wire Works
Black-Clawson Company
Bulkley, Dunton Pulp Co. Inc.
Cheney Bigelow Wire Works
Hayden Wire Works
International Wire Works
Lindsay Wire Weaving Co.
Shartle Brothers Machine Co.

ALPHABETICAL INDEX TO ADVERTISERS IN THIS ISSUE

A

Allis-Chalmers Mfg. Co. 3
Andersen & Co., J. 51
American Colloid Co. 52
Appleton Wire Works, Inc. 43
Appleton Woolen Mills 47
Armstrong Machine Works 29

B

Bird Machine Company 11
Black-Clawson Co. 55
Builders Providence, Inc. 26
Bulkley Dunton Pulp Co. 63
Betz, W. H. & L. D. 52

C

Cameron Machine Co. 49
Carthage Machine Co. 59
Clark, Frederic C. 52
Classified Advertising 54

D

Davis, Frank H. Co. 58
DeLaval Steam Turbine Co. 52
Dilts Machine Works 55
Downingtown Mfg. Co. 2

E

Ecusta Paper Corp. 50
English China Clays Sales Corp. 50

F

Fanwick-Airflex Co., Inc. 17
Ferguson, Hardy S., & Co. 52

G

Geigy Company .....Front Cover
General American Transp. Co. .....6 & 7
Gibbs-Brower Co., Inc. 58

H

Hall, Thomas W., Company 56
Hardy, George F. 52
Harrington & King Perforating Co. ... 50
Hayden Wire Works 59
Hendrick Mfg. Co. 52
Heppenstall Company 21
Hooker Electrochemical Co. 15
Hamblet Machine Co. 50
Hubbs Houses 45
Hudson Sharp Mch. Co. 51

I

International Nickel Co. 32
International Wire Works 52

J

Johns Manville Corp. 16

K

Kalamazoo Tank & Silo Co. 51
Kinsley Chemical Co. 52

L

Langston Co., Samuel M. 53
Loomis Talc Corp., W. H. 59
Lyddon & Company 31

M

Main, Inc., Chas. T. 52
Merritt-Chapman & Scott Co. 52
Michigan Steel Casting Co. 59
Moore & White Company 52
Manhattan Rubber Co. 52
Murray, D. J., Mfg. Co. 47
Millar & Co., Inc., Geo. W. 52

N

National Oil Products Co. 13

O

Oakite Products, Inc. 53

P

Parsons & Whittemore 31
Potdevin Machine Co. 50
Price & Pierce, Ltd. 51
Pennatex Oil Corp. 53
Paper Conv. Mch. Co. 53
Pittsburgh Plate Glass Co. 27

R

Ross Paper Machinery Co. 57
Ross, J. J., Company .....56 & 58
Rotogravure Engrg. Co. 59

S

Shartle Bros. Machine Co. 55
Smith & Winchester Mfg. Co. 53
Sun Oil Company 4
Shuler & Benninghofen 25
Spray Engrg Co. 5
Socony Vacuum Oil Co. .....Back Cover
Stone & Webster Engrg. Corp. 52

T

Tidewater Assoc. Oil Co. 52
Trayor Engrg. & Mch. Co. 43

U

United States Rubber Co. 24
Union Machine Co. 49

V

Vanderbilt Co., R. T. 8

W

Waterbury Felt Company 53
West Virginia Pulp & Paper Co. 49
Woodward Baldwin & Co. 45
Worthington Pump & Mchy. Co. 19

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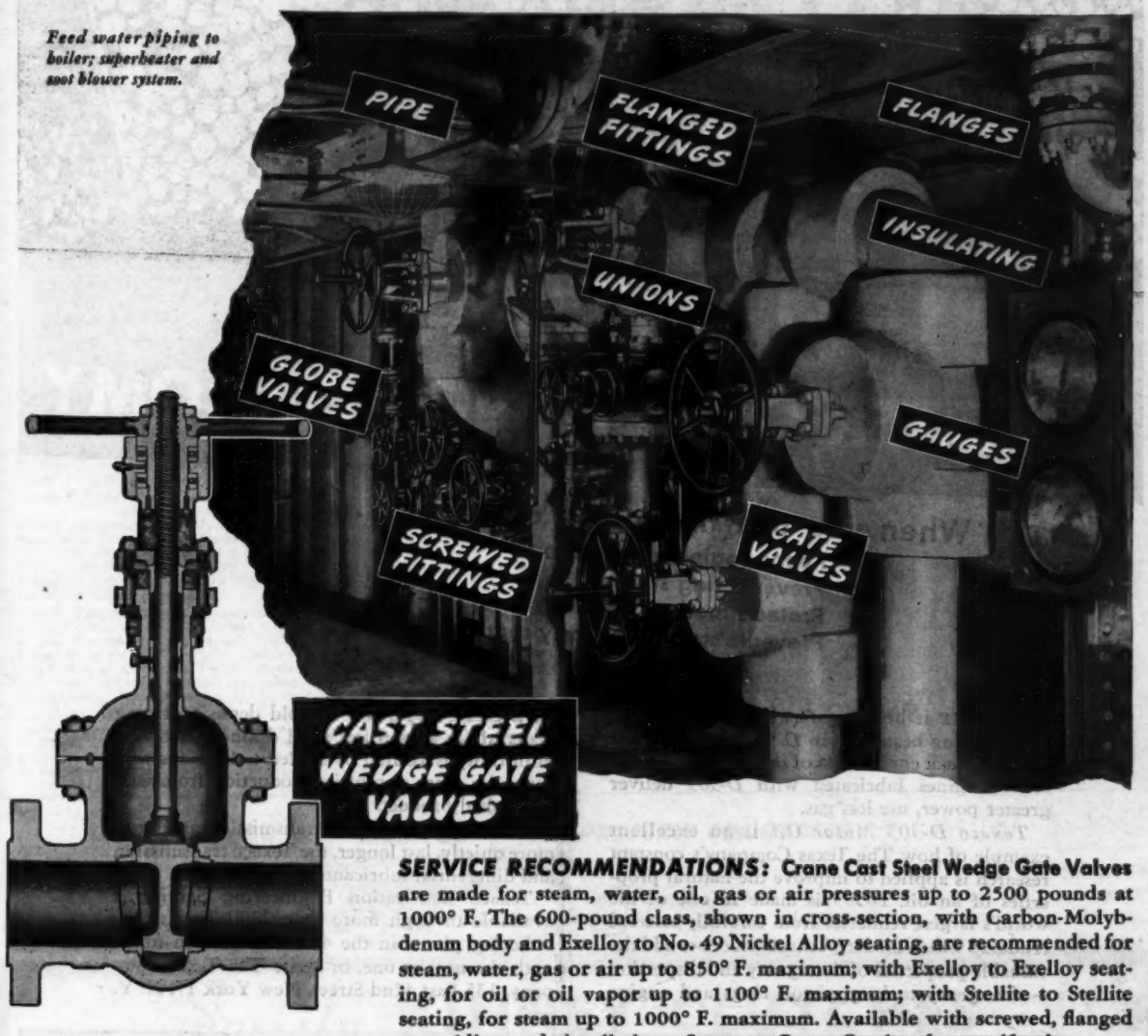

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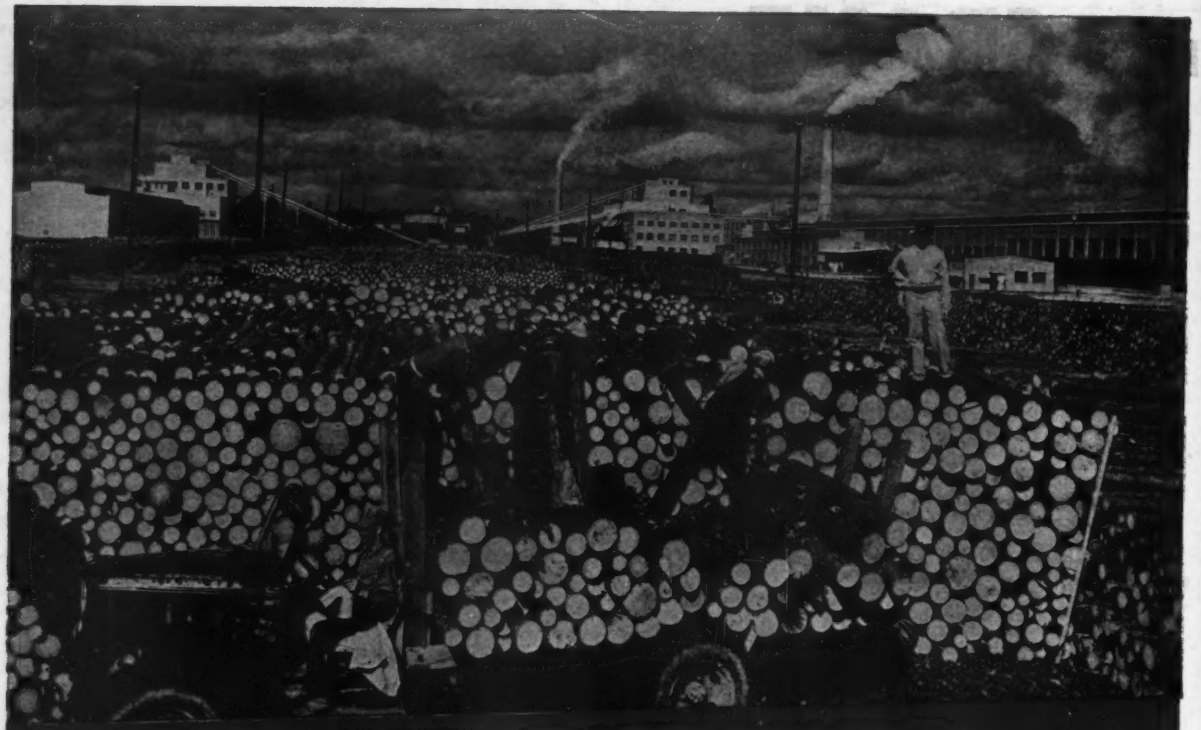

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